Heating and Ventilating

For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning

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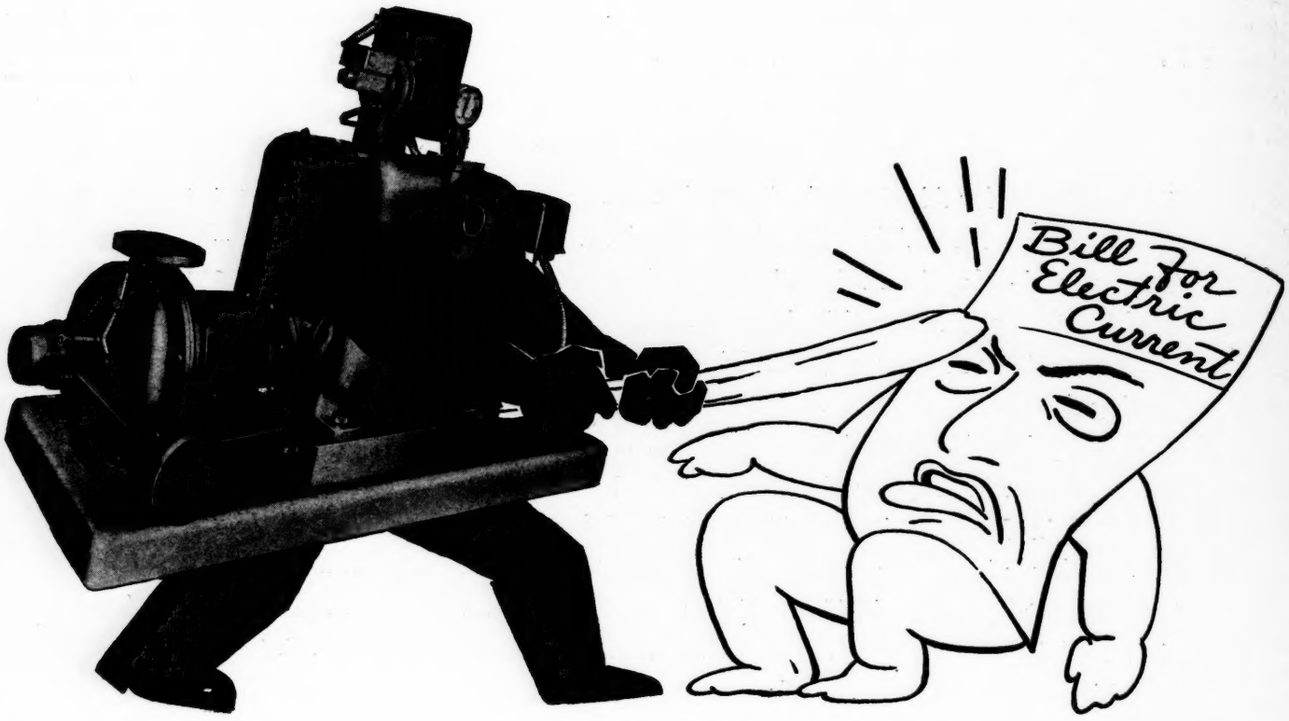

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A Test House for Air Conditioning Units

By GORDON THOMPSON†

IN the development of a design for a satisfactory air conditioning unit the maker must ascertain the effect on performance of permitting each of several factors to vary over the range expected in service. The effects of pitch and velocity of fan blades, areas of heat transfer surfaces, temperature of cooling water, moisture in incoming air are just a few of the many problems to be solved and on which engineering test data must be available. But when the design has been perfected and the unit is offered for sale, the interest of salesman and of purchaser centers on the performance of the device under the conditions of the installation. Much of the manufacturer's engineering data will be required by the successful salesman but the purchaser seldom understands the technical jargon and seeks some more familiar expression of the machine's capabilities.

Some such considerations prompted the replies which central station representatives submitted as to the kind of tests they wanted made at Electrical Testing Laboratories in the survey of air conditioning units authorized by the Association of Edison Illuminating Companies. "Engineering data from the manufacturer are essential to selection of proper equipment for a given installation but the stuff will be sold on the basis of what it does when operating in something that looks like a house." With such answers from public utilities, advertising agencies, and manufacturers, Electrical Testing Laboratories decided not only to provide equipment for determining the engineering data but also to set up a test house of typical construction in which the performance of a device could be studied under "natural" conditions.

Now it is admitted at once that the performance results obtained in the operation of a given device in such a house cannot be extended to predetermine the performance of that device in a structure differing radically from the test house as to wall, windows, air changes, sun load, and so on. But there is nothing unusual in this. The same observation applies in varying degree to any set of performance data obtained either under "laboratory" conditions or under "natural" conditions. But the results obtained in a test under a certain set of ambient conditions accepted as "standard" will have value for comparison purposes, and will throw light on the relative performance of two machines as designed to take care of a particular installation.

Furthermore, the performance of some devices will be affected by the size, and especially by the ceiling height, of the space in which they operate. Again, some devices will be operated only for short periods during the day to mitigate extremes of temperature and humidity. In such cases the results obtained, under transient conditions, are intimately connected with the thermal mass and thermal conductivity of the house structure. The device may do a very good job in the short-time emergency but a poor one in all-day service. A test house of typical construction makes a good proving ground on both of these counts.

It was felt that a wooden house, with the usual frame construction found in a well-built structure, finished in clapboard siding, would probably be the most acceptable form of test house. The following paragraphs describe in some detail the construction of the house which Electrical Testing Laboratories has erected, the method of producing and controlling the "weather" around it, and the equipment for measuring temperatures, energy consumption, and so on.

Construction of Houses

This cottage consists primarily of a single room, 14 ft. × 28 ft., ceiling height 8 ft. 6 in., provided with two single windows and two double ("mullion") windows. By means of removable partitions this space may be divided at will into two rooms of equal size. One partition is of the type frequently found in cottages to separate living room from dining room, with square columns mounted on box pedestals. The other is a stand-

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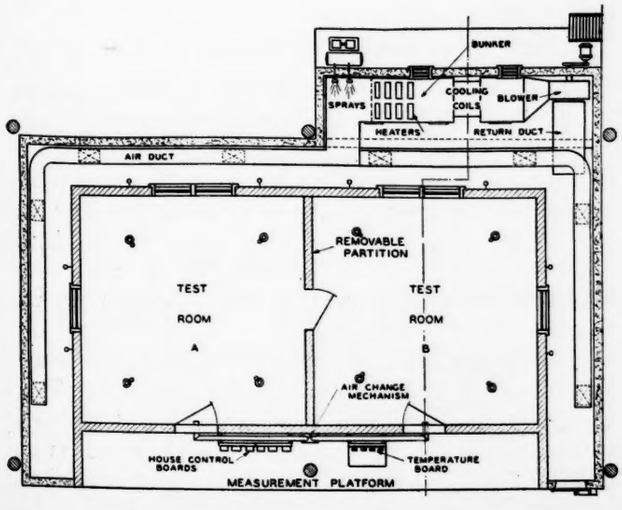
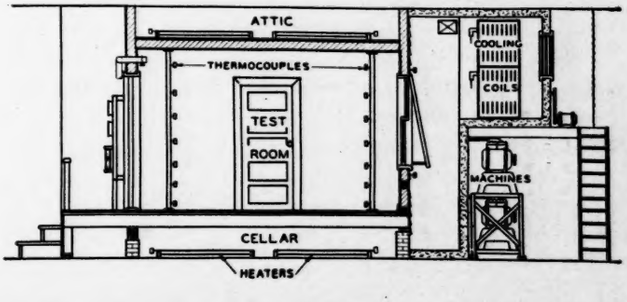
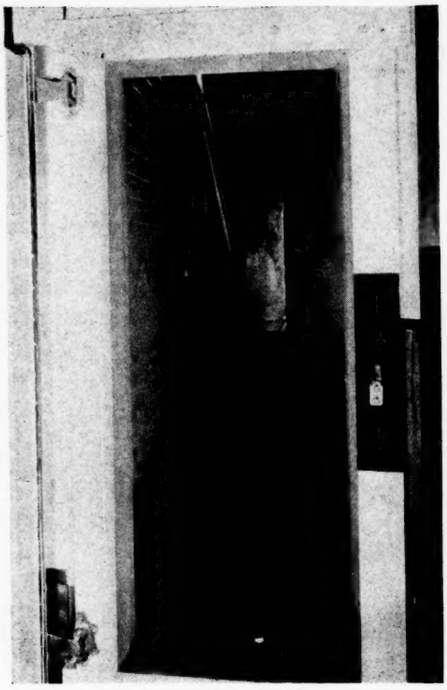


Fig. 1. (Left) Plan view of test house. Fig. 2. (Below) Section through test house showing interspace and location of refrigerating equipment.





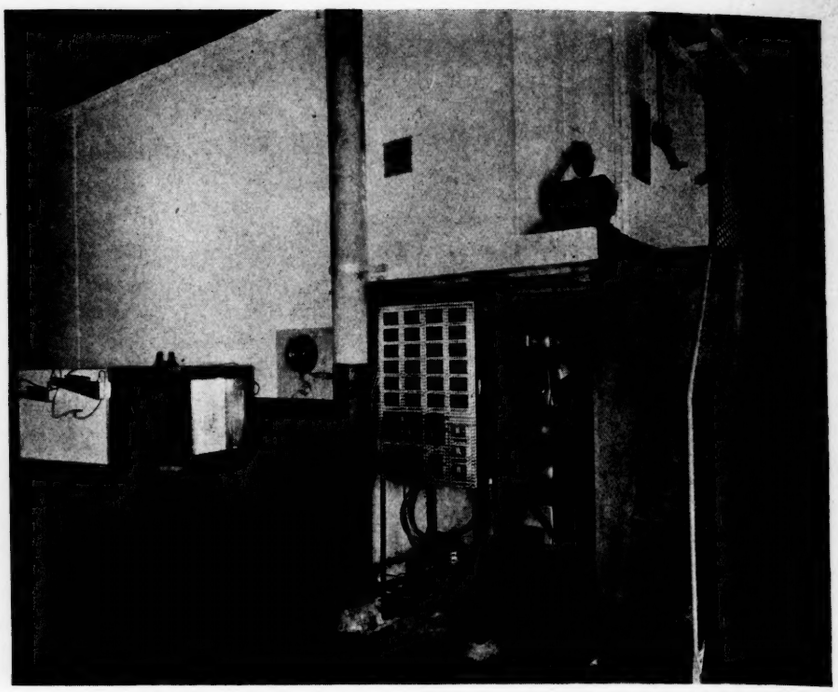


Fig. 3. (Left) Looking into interspace. The edge of the refrigerator door is shown to the extreme left in the foreground. Fig. 4. (Right) Control panel for the conditioning equipment.

ard partition wall with a door which can be used where more complete separation of the two rooms is desired. The house is surrounded on three sides by a corkboard wall 42 in. from the house. There is an elevated bunker space on the long side. The fourth side of the house, open to the laboratory, is conceived to correspond to the inner wall of an actual house. Equipment is provided to produce the desired "weather" in the interspace, between the house and the enclosing wall, with temperatures ranging from 0° up to about 110° F., and with the desired degree of humidity. Fig. 1 gives a plan view of the installation, while Fig. 2 shows a section through house, bunker and machinery spaces.

Air Change

In addition to the heat transfer which takes place through the walls and windows of a house there is the heat transfer by air change, the heat represented by the sun load, and the heat from human beings (assumed to be) in the room. The matter of air change through the test house has been handled by making the house as nearly airtight to the "outdoors" as possible, with provision for producing definite, measurable air changes as desired. To this end all cracks in the clapboard siding were carefully closed with putty before painting and the windows were provided with weatherstripping. Air from the interspace is then drawn into the test house through the 4-in. openings provided under each window. One of these openings is visible in Fig. 5. In order to prevent air change by convection currents through an opening of this size and also to maintain the thermal insulation of the outside walls, these openings have been filled with large-size marbles. Air is drawn from the rooms through two small ducts, to be seen in the foreground of Figs. 5 and 6. These ducts pass down to a measuring box equipped with anemometers, and thence into the cellar where the suction fan is located.

Sun Load

Sun load within the rooms is represented by resistance-wire frames set on the floor in front of the windows on the side where sun load is assumed to be occurring. These frames are connected to convenient receptacles in the room, which in turn lead back to the house control boards shown in Fig. 5 where measuring instruments and controlling rheostats are provided so that the power expended in the frames may be set at desired values. Resistance wire was placed under the clapboards on the three sides of the house during construction and constitute three independent circuits brought to the control board and provided with conrolling rheostats and measuring instruments. With these circuits the sun load falling on the walls on any side of the house may be represented.

House Enclosure

The corkboard wall surrounding the house on three sides is 4 in. thick. The heat transfer through the walls and windows of the house into the interspace with an ambient temperature there of 0° and a temperature of 70° in the test rooms has been computed to be about 21,000 B.t.u. per hr. The heat transfer through the cork wall under the same conditions has been estimated as less than 10,000 B.t.u. per hr. Obviously, there was no economic need for a thicker cork wall. Great care has been taken, however, to make the cork wall watertight since the infiltration of moisture has a direct bearing on the frequency with which the cooling equipment must be defrosted. A 4-in. layer of cork is laid on the concrete floor in the interspace and the ceiling of the

interspace has been similarly covered. The exterior of the cork wall has been finished, for appearance sake, with a wall board on furring strips, painted in white and green. A refrigerator door at one side gives access to the interspace (see Fig. 3).

The air in the interspace is changed by means of a blower rated at 10,000 c.f.m., driven by a 1.5-hp., 3-phase, 60-cycle induction motor. The air on the suction side is picked up at the floor level by a vertical duct at the southeast corner of the enclosure. This is the most prominent object in the view shown in Fig. 3, looking into the interspace through the door. After passing through the fan, the air is delivered to a galvanized sheet-iron bunker which is equipped with two banks of cooling coils, five groups of heating coils, and two water-spray nozzles. After being suitably conditioned in this bunker space, the air is delivered to a duct system running along the ceiling of the interspace. The ducts have eight discharge openings with louver dampers for adjustment of the distribution of the air.

"Weather" Mechanism

Cooling of the circulating air is obtained by means of six refrigerating units driven by 3-hp., 3-phase, 60-cycle induction motors. The compressors are 3-cylinder and the refrigerant is methyl chloride. The flow of cooling water through the condensers is regulated by pressure-operated valves. The cooled refrigerant passes through calcium chloride driers and thence to the thermostatically-controlled expansion valves at the cooling coils in the bunker. There are solenoid-operated valves just ahead of the expansion valves for use in automatic temperature control. The motor circuits are closed with solenoid-operated starters with thermal overload cut-outs and there are the usual "high-low" pressure-operated tripping contacts in the electric control circuits. The refrigerating machines are mounted in an angle-iron rack in two tiers, with three machines in each tier. Fig. 7 shows the arrangement.

As previously stated, the cooling coils in the bunker are arranged in two banks, one above the other, three of the machines being connected to the upper bank and three to the lower bank. The banks are isolated by means of corkboard enclosures equipped with swinging doors on both intake and discharge sides. These doors swing on trunnions which project through the insulating wall on the east side where they are provided with weights which when released hold the doors tightly against the coil enclosure. The trunnions and weights appear at the upper right-hand corner of Fig. 4 which shows the south-east corner of the structure. Triple-glass windows permit inspection of the cooling coils to observe the degree of frosting. When a bank of coils is beginning to lose effectiveness due to frosting, the front and rear doors for that bank are closed, the expansion valves and condensers for the proper machines are "shunted," and the hot gas from the compressors enters the coils directly. In this way the frost and ice are removed promptly from one half of the coils while the remaining half remain in active operation, thus resulting in minimum disturbance of the temperature in the interspace.

The 20 heating coils are arranged in five groups of four coils each connected for delta operation across a 208-volt, 3-phase system. They are of the strip type, mounted horizontally and are connected in circuit through solenoid-operated relays shown at the bottom of the control panel, foreground in Fig. 4.

The two spray nozzles for producing the desired humidity are fed from a turbo-filter and float-valve supply tank through a motor-driven gear pump provided with strainer and pressure equalizer. Eliminator plates in the bunker following the nozzles remove any water not vaporized.

In addition to controlling the weather conditions existing about the house, provision is made for adjustment of temperatures in the cellar and attic spaces. The circuits for the heater frames in these spaces are brought to the house control board to be seen in Fig. 5. Control rheostats and measuring instruments are also provided on this board.

Temperature Measurements

Temperatures are measured at all desired points by means of thermocouples formed of copper and "constantan" wires. In the living rooms it is planned to survey the temperature distribution rather completely. For this purpose four tubular standards are provided in each room and on each of these standards are mounted seven thermocouples shielded from direct radiation by short lengths of chromium-plated brass tubing, the first being 4 in. from the floor and the seventh 4 in. from the ceiling, with the others distributed to give temperatures at knee height, breathing level, and at three additional points. These standards are served through flexible leads in rubber tubing and may be set at any desired position in the room. Eight additional thermocouples are available in each room for measurements of temperature at other points. The distribution of temperature in the interspace will be observed by means of 16 shielded thermocouples distributed over the outer wall of the house. In addition there are 16 thermocouples in the interspace available for experimental work. Eight shielded thermocouples are provided to show the temperature in the attic and a similar number in the cellar. All of these thermocouples, 128 in number, are brought to selector switches on the measuring platform in front of the house (see Fig. 6). The value of temperature corresponding to the e.m.f. set up in these thermocouples is measured by means of a direct-reading potentiometer-type of temperature indicator in conjunction with a box-type reflecting galvanometer.

The switchboard in Fig. 5 is also provided with instruments for measuring electrical input to the air conditioning machines which may be in operation in either or both rooms. Electric counters are used to determine the number of cycling operations of refrigerating equipment. Other instruments not shown in the pictures are available for measuring water consumption, steam or hot water supply, steam and water temperatures, etc.

Air motion in the test rooms is to be observed by means of a specially-designed anemometer of the thermal type in which an incandescent lamp filament carry-

ing a heating current has its resistance measured in a special bridge.

Humidity conditions in the test rooms will be shown by wet-bulb thermocouples, provision being made on the standards shown in Fig. 5 and Fig. 6 to provide four such wet-bulb thermometers in each room.

Control Equipment

Among the factors to be controlled, that of temperature is the most important. When the temperature in the interspace is to be held at a value below that of the air outside the enclosing wall, refrigeration is required; when interspace temperatures are higher than ambient, heat must be supplied. For the lower temperatures a sufficient number of refrigerating machines are operated continuously to produce a temperature which is slightly above that desired. Additional machines are then set to operate under control of a contact-making thermometer. This thermometer is of the mercury-in-metal-tube type and has a bulb shaped to give high ratio of surface to volume. The bulb is placed in the return air duct. The circulation fan produces between three and four changes of air in the interspace per minute but the rise in temperature from ceiling to floor in the interspace is expected to be of the order of 5° when the average temperature is 0°. The difference in indication between the contact-making thermometer and the average interspace temperature about the house as shown by the thermocouples on the house wall is used as a correction to be applied to the setting of the thermometer contacts. The thermometer closes the circuit through a low-voltage relay system which in turn is used to open the circuits of the solenoid valves on the pressure side of the compressors which are accomplishing the temperature regulation.

When temperatures above the ambient are to be maintained in the interspace, sufficient heater coils will be energized to produce a temperature slightly lower than that desired and regulation will then be accomplished by the contact-making thermometer, previously referred to, controlling the connection to circuit of an additional bank of heater coils. When the desired temperature is only slightly below the existing ambient, one refrigerating machine will be run continuously and temperature will be maintained by intermittent connection of a bank of heating coils.

The electric circuits for control have been laid out to be as flexible as possible. Fig. 7 shows the control board for the refrigerating and heating equipment. Any number of the six refrigerating machines can be caused to operate under the control of the contact-making thermometer and, similarly, any number of the five groups of heating elements can be controlled by the thermometer.

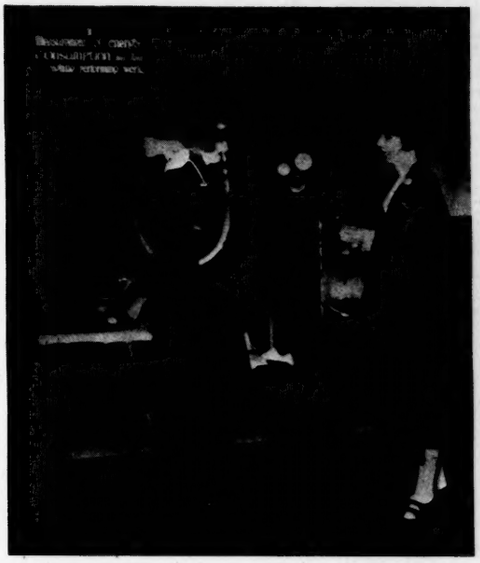
Humidity is controlled by a multiple-hair hygrostat placed near the entrance of the return-air duct. The electrical contacts close the circuit through a relay which starts and stops the motor driving the gear pump which services the spray nozzles. This device is sensitive to better than 1% of relative humidity over a wide range of temperature.

Watt-hour meters are provided to measure the energy consumed in the blower motor, the motors of the refrigerating units, and in the heating coils. A water meter is provided to measure the amount of cooling water used. Thermometer wells have been provided to show temperature of the water delivered to the condensers of the refrigerating machines and of the water as it leaves the condensers.

Test runs are now being made to determine energy requirements under various conditions of operation. The transmission through the walls of the house will be determined and some work will be done in the determination of performance of steam radiators of the standard type to give a popular idea of the amount of heat required to maintain a temperature of 70° in the test rooms when the interspace is at 0°. Following the determination of the constants of the test house, the testing of unit types of air conditioning equipment will be begun in earnest.

Fig. 5. (Left) House control switchboard including instruments for measuring input to the conditioning machines. Thermocouple standard is shown inside the room. Fig. 6. (Center) The 128 thermocouple leads are brought to selector switches on this measuring platform. Fig. 7. (Right) Control board for the refrigerating and heating equipment.

Research Sets New Values for Heat Emission from Human Beings



Portable apparatus used by Carnegie Institution for measuring energy consumption of human beings. From these tests values of heat emission were determined.

SOME recently completed research by the Carnegie Institution of Washington has resulted in determination of the amount of heat given off by human beings engaged in various forms of activities. The resulting figures are of interest to air conditioning and ventilating engineers in the calculation of the load. The work was conducted by Dr. Francis G. Benedict and Cornelia Golay Benedict at the Institution's Nutrition Laboratory in Boston.

The figures published by Doctor Benedict are considerably less than those previously accepted, and their use would result in an important decrease in that part of the air conditioning load calculated as due to heat emission from the human body.

According to Doctor Benedict, the human body, being a living machine, is obliged to expend a certain measure of energy simply to keep alive. The measure of this resting energy consumption is the measure of one's basal metabolism, which is simply a base line from which to determine the extra energy required in the performance of particular tasks calling for physical or mental effort. Although the basal metabolism of every individual is different, the heat production for the average man in a group of 100, when lying quietly in bed after breakfast, is about one calorie per minute. This is equivalent to about 238 B.t.u. per hr. Just sitting up increases the energy consumption, and consequently the heat output, by 5%. Standing results in an increase of 10%, a brisk walk will increase the base figure by 200%, and work to the limit of human endurance will increase it 1000% or more.

HEAT EMISSION FROM HUMAN BEINGS

Activity	Emission, Average, In B.t.u. Per Hr.	
	Earlier Tests	Recent Tests[4]
Lying in Bed	—	238
Sitting Down	384[1]	250
Standing	431[1]	262
Brisk Walk	1731[2]	714
Limit of Endurance	2555[3]	2618

[1] *Reported by Houghton, Teague, Miller, and Yant at A.S.H.V.E. Research Laboratory.*
[2] *Reported by Douglas, Haldane, Henderson, and Schneider.*
[3] *Reported by Benedict and Carpenter for "Very severe exercise."*
[4] *Reported by Dr. and Mrs. Benedict, Carnegie Institution.*

It must be borne in mind that a heavy man gives off more heat in support of basal metabolism than a thin man of the same height. A tall man expends more than a short man of the same weight. A man of 25 years of age expends more than a man of 70.

The sex, too, is important in these calculations, since a man's basal metabolism runs about 10% higher than that of a woman, even though the weight, height, and age are the same. Consequently, in calculating the air conditioning load, consideration should be given to these factors, if the human load consists of predominantly one or the other of the above mentioned types rather than of average types.

The accompanying table gives the heat emission of human beings engaged in various occupations, as reported by previous and these recent tests.

In discussing the discrepancy between the figures in the two columns, Doctor Benedict calls attention to the possible explanation that people in the two different tests were in different digestive stages. The Carnegie Institution tests were made with people in the so-called "post-absorptive" stage; that is, at least 12 hr. after the last meal. The earlier figures were averages of results obtained at different times during the day in reference to the meals, so that the results would apply to average conditions.

If it is assumed that the two series of tests were both accurate and correct for the conditions for which they are run, and since the prior tests give a much higher figure, then the maximum metabolic rate, which is that just after meals, must be greater than that during the "post-absorptive" stage. The work by Doctor Benedict shows that this is true, and he reports a heat output of as much as 40% over the basal rate. This gradually falls off over a period of from 10 hr. to 12 hr. This would indicate that calculations involving the human load in restaurants would be based on a much higher figure than shown in either of the columns.

It was shown that mental effort, contrary to popular belief, does not consume energy rapidly and, consequently, the heat output is not increased greatly over the basal rate. The increase was on an average of about 4%.

My Impressions of South American Practice

By RUDOLF KUHLMANN†

Heating and air conditioning in our sister continent as observed by the author, who recently returned from a trip to the more important South American countries. Mr. Kuhlmann last year reported here his notes on a similar trip through Europe

FROM Brazil to Uruguay, then to Argentina, Chile, and Peru is the conventional 'round South America trip, and is the itinerary I followed last winter. These countries contain about 80% of the 80 million people in this sister continent of ours, and in order to talk to the man in the street, it is necessary to use Portuguese in Brazil, "Argentinian Spanish" in the Argentine, and a "near Castillian" for the other three countries.

Rio de Janeiro (population 1,500,000), said to be the most beautiful port in the world, is in a climate that needs air conditioning, for the humidity is very high practically all the time. My sling psychrometer showed relative humidities from 65% to as high as 90%.

The Compania Telephonica Brasilena installed a dehumidifying plant in its Ipanema Exchange about a year ago. It is an adsorption-type machine using gas for reactivation as shown in Fig. 3. The chief engineer told me that the use of dehumidification was forced upon him because green mould spots had completely rotted away the insulation on wires, and soldered connections were giving trouble from rusting. I measured the relative humidity while the dehumidifier was in operation, at 41% within the air-treated section, 82% in the hall (untreated), and 90% outside the building. Operating results have been so satisfactory that another installation in Santos was already nearly completed by this same company.

†Engineer, New York.

None of the theaters in Rio has yet been conditioned, but the director of the Municipal Opera told me he had definitely decided to install a system. During Carnival Time in January, the middle of the Brazilian summer, there are frequently 6000 people dancing in this theater, and at 4 a.m., he says, the relative humidity reaches 93% with a dry bulb of 96°.

In a German hospital, now under construction, a German air conditioning system is being installed with conventional ammonia compressor, pipe-inside-pipe condenser, and spray washer. The unusual feature of this design is the use of 10 separate air mixing chambers, one for each main duct. Refrigerated air, heated air, and filtered outside air, each with a controlling damper, are fed into the separate mixing chambers.

Sao Paulo (population 900,000), an overnight run from Rio, is the commercial center of Brazil. It is on a plateau 2500 ft. above sea level, and consequently experiences lower relative humidities and somewhat lower winter temperatures than Rio.

Here I was conducted through another Municipal Opera House (Fig. 2) by the architect who supervised its construction 25 years ago. This is claimed to be the first air conditioned building in South America, and the equipment was installed with the help of German engineers. Ordinary city water is stored in a deep well to cool it and used in a spray washer for evaporative cooling. Warming is accomplished through stack heat-

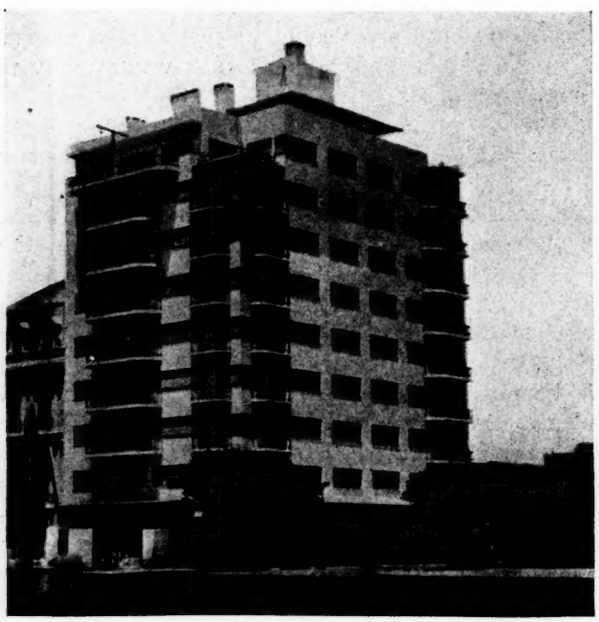
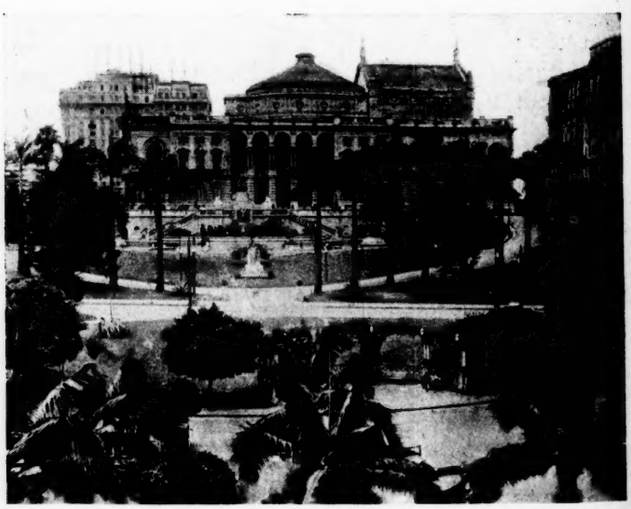
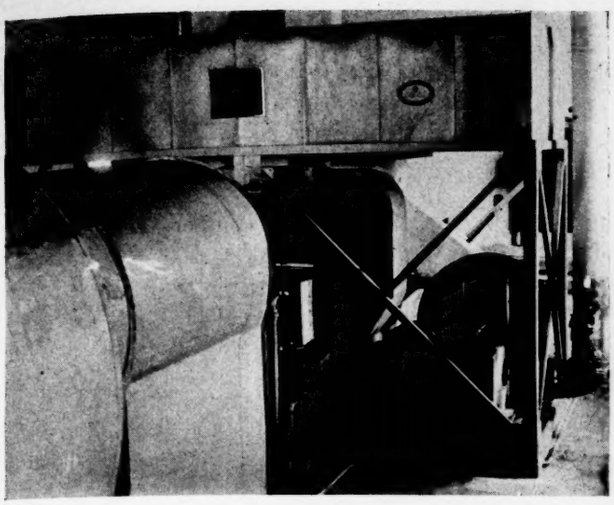


Fig. 1. (Left) An apartment house illustrating the modern architecture used in many new buildings in Buenos Aires. Fig. 2. (Below) Municipal Opera House, Sao Paulo, Brazil.





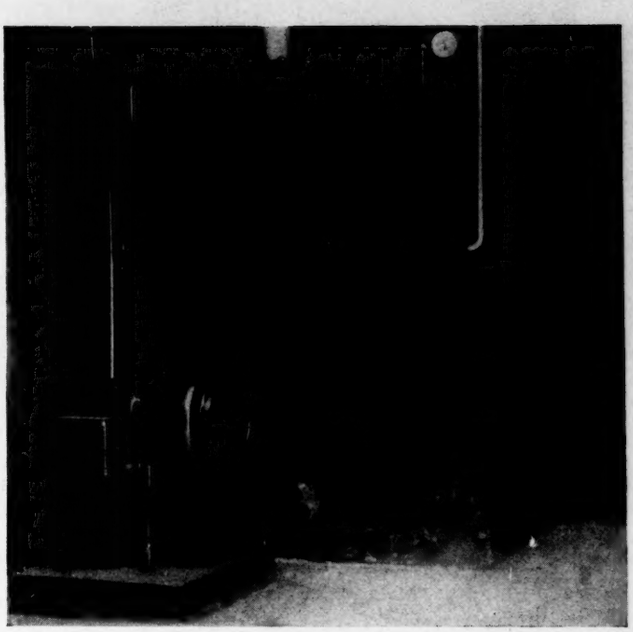


Fig. 3. (Above) Adsorption dehumidifier using gas, in telephone exchange building, Rio de Janeiro. Fig. 4. (Right) A European, cast-iron, down-draft, coke-type boiler, fired by an American-made oil burner in Buenos Aires.

ers. Washable wool cloth filters are used in the air intakes. The main duct is of concrete and circles the whole theater under the auditorium floor. Vertical branch ducts containing appropriate supply grilles are taken off at regular intervals about the auditorium and lead up to a top plenum chamber covering the dome of the theater. From this plenum, outlets project conditioned air downward into the auditorium. Exhausts are located below the seats and lead in 16 groups to the main return duct. A 6-ft. diameter disc fan is used on the supply end and a similar fan for the exhaust.

Interesting to the traveller, but a sad spectacle for the Brazilians, is the burning of surplus coffee. Fig. 5 shows a coffee pile in the erstwhile coal bin of a large paper factory near Sao Paulo. This coffee is being used to fire three 250-hp. boilers for the power requirements of the mill. The coffee is dumped into a hopper, well above the boilers, slides through pipes to each boiler by gravity (45° angle or better necessary) and then feeds into the fuel bed through a control gate. This coffee is part of the surplus to be destroyed. The mill pays merely the cost of transportation, about $1.60 per ton. I was told it contains 6000 B.t.u. per lb., or less than half that of coal, and I saw it burning very satisfactorily in these boilers. My belief was confirmed by the engineer, however, that the boilers must be cleaned very frequently. They were burning about 80 tons of coffee per day or 2400 tons a month.

Wood is used widely as a fuel in Brazil, especially in less well developed sections. Some coal is mined in Brazil but it is of such a poor quality that when a few years ago a law was passed requiring each fuel user to buy 10% of his requirements in native coal, many users threw this coal away rather than try to burn it. Oil and most of the coal that is used must be imported, so that neither fuel is now favored as a national policy. The oil companies supply only diesel oil, heavy fuel oil, and a fifty-fifty blend of these two, but not furnace oil.

At *Montevideo* (population 500,000), I found a definite demand for heating equipment. Uruguay may be grouped with Argentina and Chile in appraising their heating requirements. All three have winter at the time of our summer. To compare winters, consider that where ours, in the northern states, is of eight to nine months' duration, theirs is from three to four months long. In addition, the heating contractors told me that they use a 32° base for heating calculations. This comparatively small maximum capacity requirement and the shorter season operate to reduce the total fuel required.

Buenos Aires (population 2,500,000), overnight by boat from Montevideo, is the metropolis of all South America. One subway in use and another under construction evidence its municipal development. Its progress in our own industry is important, too. At least six large buildings are now air conditioned and four more, to my knowledge, are in process of making installations. It is practically accepted that all new buildings and most new homes of quality shall have central heating plants. And in by far the majority of these installations automatic oil burners are used.

Argentina is rich in oil-producing capacity, with wells in the North at Salta and in the South at Rivadavia. There are no coal mines to speak of, so all the intense nationalism of this country is directed to furthering the use of oil. A government oil company as well as American and English-owned concerns are in operation here. Five grades of oil from furnace oil to heavy fuel oil are furnished. A number of our American oil burner manufacturers are represented, and at least two of them have had elaborately illustrated catalogs printed in Spanish. There is some local production of burners, usually built of parts shipped from the U. S. The official of one oil company told me that he conservatively estimated that 500 automatic oil burners would be sold in Buenos Aires alone in 1934.

A typical installation of an American burner in an apartment house basement is shown in Fig. 4 wherein also the conventional European, cast-iron, down-draft, "coke-type" boiler can be seen. Most of their boilers are imported from Europe, although some are from the European factories of an American-owned company.

The humidity in Buenos Aires, though not usually as high as in Rio or in Lima, is oppressive.

Theaters, banks, hotels, office buildings and even apartments, are all represented here with central air conditioning systems. Perhaps they are a jump ahead of us on apartment jobs. The unit type of installation has arrived somewhat later, but is now finding a definite market.

The Plaza Hotel has an interesting air conditioning installation. Some years ago ammonia compressors, a washer, filter, and fans of Swiss manufacture were installed. Within the last two years a large capacity dehumidifier was built into the system. This is an adsorption type of dehumidifier and the unusual feature of this job is the use of hot air for reactivation which is piped from the shells of two large water-tube boilers where it has been heated by passing inside the brick housing.

In the Bank of Italy building there is an American air conditioning installation combined with English boilers and a touch of characteristically British practice in the panel heating of the luxurious directors' room.

The concealed radiator engineer would be delighted to find his troublesome space problems neatly disposed of in Buenos Aires. Windows of modern design are very wide—almost triple the width of our standard windows, and the milder winter permits smaller radiator sizes.

In looking over the piping of some 20 heating installations, I did not find a single elbow fitting except where it may have been combined with another fitting such as a union. The tendency to bend the pipe instead of using elbows, as we do, probably finds its explanation in the considerably lower wage rates which prevail in Buenos Aires.

It is surprising indeed to see building after building going up without the use of steel beams or columns. Concrete, reinforced with steel rods, is the universal method for even the largest buildings. Concrete is much cheaper than fabricated steel which must be imported from high labor cost countries and carries a stiff duty besides. Once the concrete slabs have been poured the builders seem nearly to tear the structure apart again with pneumatic chisels and hammers to provide the holes and channels for heating pipes, electric conduit, and plumbing lines. Apparently, labor is cheap enough to make this preferable to careful advance planning.

Sixteen new building permits for apartment houses were issued during my first week in Buenos Aires. This indicates that a building boom is in progress in South America. Quite certainly this was the case in all five of the countries I visited. The explanation given is that since the people cannot export their funds to invest abroad due to exchange control, they are now investing in the only large internal opportunity available—real estate. So the "exchange control restrictions" have seemingly been a real boon to the building industry, however bad they may have been for general business. Fig. 1 is indicative of the style of modern apartment houses, many of which are now under construction.

A flight from Buenos Aires to *Santiago* (population 700,000) reveals that the high ridge of the Andes is a dividing line in more ways than one. Coal is for Chile what oil is for Argentina—the nationally favored fuel; for South Chile has many coal mines but no oil wells. Where Buenos Aires has high humidities, Santiago has a very dry climate. During my stay, I measured relative humidities as low as 28% and the maximum was 45%.

Since coal is the favored fuel we naturally expect to find stoker installations here instead of oil burners as in Argentina. Not only is this true, but of the two or three hundred oil burners installed before the recent peso depreciation practically all have been taken out. Before the war pesos exchanged at about eight to our dollar. During the height of inflation two years ago they went to 60 to the dollar, raising the price of imported oil about seven-fold but leaving the internally mined coal at the old price. Since then the peso has strengthened to a level of about 25 to the dollar. The government, however, seems determined to keep the oil burners out, having imposed not only an installation tax but a continuing operation tax as well.

A striking example of the desire to utilize coal wherever possible is the coal-burning autobuses. When I say coal burning, I mean just that. The coal is burned in what looks like one of our standard vertical creamery-type steam boilers fastened usually to the back of the bus. As a matter of fact it has no tubes or water in it. It is just a steel shell with grates on which to burn the coal, a hand-operated fan for creating starting draft, and two pipes leading from its top to carry the gases of combustion to the front of the car into the inlet ports of the motor. In other words, the gas from coal combustion, in effect producer gas, is used in the same engine that had formerly been used with gasoline.

Air conditioning has made a start here, too. The people of this section are particularly fortunate in that the low humidity permits use of evaporative cooling systems requiring very little or no refrigeration. Thus, they secure comfort conditions at a much lower first cost and operating expense than if dehumidification had to be dealt with. Furthermore, 55° water is supplied from a mountain lake at negligible cost. Both the leading theaters have systems of this type, one using German equipment and the other American.

It was in Santiago that I met the only member of the A.S.H.V.E. from South America, and had the pleasure of dining at his home. He was kind enough to allow me to take the picture (Fig. 6) of his own heating plant. Since there are usually no basements in South American houses, the boiler is located on the first floor. It is a hot water system and the picture shows that the boiler is much smaller than that required for a medium-sized home in our country. Although South Americans are keen to keep abreast of the latest advances here and in Europe, they also have ideas of their own. One of these is the method of heating domestic hot water in the plant I have just been describing. The tank above the boiler is made of wood and filled with the water to be heated. There is an ordinary cast-iron radiator inside the tank which is piped to the hot water boiler below. This radiator, heated by hot water from the boiler, in turn heats the domestic water around it inside the tank, and the tank water is then piped to the faucets.

Peru is sub-tropical, and heating is usually required only in the mountains. But humidities are very high and an architect in *Lima* (population 250,000) described the basement of one of the banks, saying there were streams of water running down its walls from atmospheric condensation.

Oil is the fuel of Peru as of Argentina. In the northwest corner of the country are many wells, and although some coal is produced in the mountains, it is small in amount and expensive to transport to market.

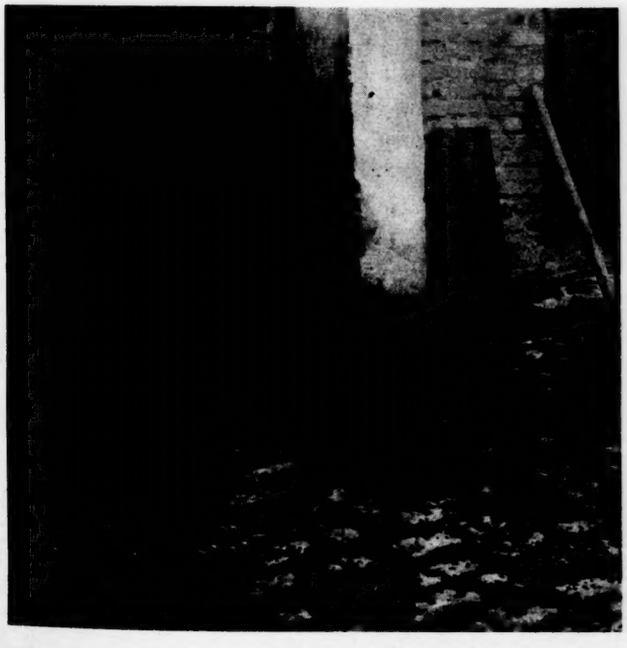
Throughout South America the fact that its air conditioning and heating industry is but lately born and has been fostered from abroad is easily observed. The boilers are essentially European. Air conditioning shows German influence, but is mostly American. Panel heating comes from England. Oil burners and stokers are brought in almost entirely from our country. As a result, the first grade contractor in South America, being exposed to these varied influences, is really much more broadly informed than the localized American, German, or English contractor, who knows usually only the practice of his own country.

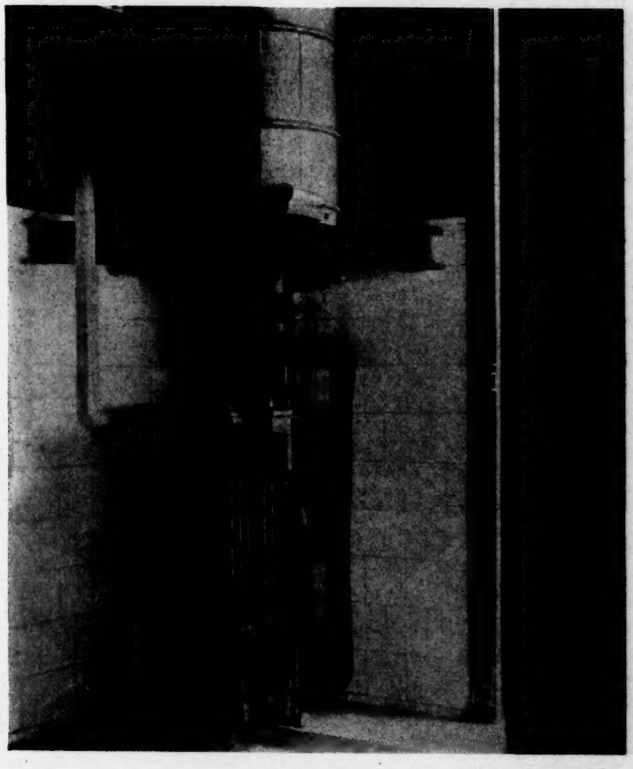
A year ago, I had the opportunity of making a similar trip through Europe and was impressed with the tendency to nationalism and to self-sufficiency through manufacture of the products these countries had formerly imported. Knowing that South America was not greatly industrialized, I was unprepared to find precisely the same condition there. However, rapidly depreciating currencies that raise prices of imports four- and five-fold, exchange control commissions, and high tariffs can do some mighty upsetting things to normal economics. I saw radios, refrigerators, and even highly technical sound machines for movie houses made in Brazil. I saw oil burners and boilers manufactured in the Argentine. But everywhere I felt the impermanence of this situation for many of these products. It is true that the hourly labor scale is very much cheaper in South America. Welders, for instance, receive half our rate in Argentina and one-third to one-fourth in Brazil, Chile, and Peru. However, upon close investigation it is evident that the efficiency of the worker is lower, so that the net cost of work is about equal.

Comments about the bad feeling existing in South America toward our country have been bandied back and forth a good deal. I heard much talk about this feeling but most certainly failed to experience any of it in actual existence. On the contrary, I discovered a sincere, friendly admiration where we had accomplishments to our credit and a desire to do as much business with us as possible. It is important, to be sure, that a manufacturer who wants to enter the South American market take the necessary steps to protect his business, for competition is just as keen and doublefisted there as it is here. Many of our manufacturers would be surprised to know that their catalogs for years back have been carefully kept, and I talked to a number of contractors who had a more complete file of American catalogs than most purchasers here have. It is true that German and English companies have been selling cheaper and giving better terms, but there seemed only to be regret that we could not meet these conditions so they could give us the business.

It is an axiom that the South American does his business where his heart is, and his feelings are his guide more often than his reason, yet his decisions are frequently better ones because of this very fact. To overlook this characteristic would be a serious mistake; to catch some of that spirit ourselves will do us no harm, and in this way we can reach the goal that geography has already established in making us the North and South of but one America.

Fig. 5. (Below) Surplus coffee beans are extensively used for fuel in Brazil factories. Fig. 6. (Right) This little plant on the first floor supplies hot water for heating the house and for domestic uses in a good-sized Santiago residence.





Bright Future of Air Conditioning

A Prediction by the Dean of the Industry

WILLIS H. CARRIER†

FOR more than a quarter of a century the science of air conditioning or manufacturing weather has been developing. It is now finding its way with marked strides into the daily lives of all of us. Though it is somewhat less spectacular, it is no less marvelous in its future outlook and possibilities than the radio, the airplane, the telephone, and all of the modern devices and the sciences which have opened up to us within our own generation.

Great sums are spent annually in travel and residence in the mountains and at the seashore largely for the freely admitted purpose of a change of climate, to escape from the heat, dust, and noise of the city and, yes, the humidity, to the cooler, cleaner, and less humid climate of the mountain and seaside resort. Such investments in improvement in climate have been taken as a matter of course, and it seems almost a certainty that in the future people will make investments to enjoy improved climates in their homes and offices as well, for equipment is available today which makes it possible to place in the home, restaurant, theater, store, or office means for producing just the climate you desire at will.

Over a year ago, when we were called in to install a million dollar air conditioning system for the studios of Radio City, I realized what strides had been made in this art since a summer 32 years ago when I worked on the first problem in air conditioning, that of humidifying and dehumidifying a lithographic plant in Brooklyn. I then tried cooling coils and calcium chloride in laboratory experiments which, although giving a great deal of fundamental data with reference to moisture in the air and its general perverseness, resulted tangibly only in utterly ruining two perfectly good pairs of expensive shoes worn by my two assistants just out of college.

In 1906, however, four years later, the first real air conditioning installations were installed based on practically the same principles of equipment and operation used today.

What will be the future development of air conditioning?

If anyone had predicted 50 years ago that the crude, unreliable, cumbersome internal combustion engine would make it possible for man to fly from coast to coast during the hours of daylight, or across the Atlantic or, even if that were possible, that the development would be practicable and commercial, he would have been considered of unsound mind.

What prophet could have possibly foreseen a century ago the great development in power transmission and utilization through the medium of that intangible, mysterious form of energy—electricity? Today, we accept it as commonplace.

Who could have visualized the tremendous extent, or even the mechanical or economic possibilities, of our present automotive transportation?

Who could have visualized the development and tremendous use of the telephone as a means of communication, to say nothing of those marvelous little electric tubes that permit us to talk across oceans without any visible means of connection?

Can we envision equally great future accomplishments in the realm of the unknown for the new art of air conditioning?

With the progress that has been made in the application of air conditioning, the prospect is immediately upon us that we shall find entire apartment houses, hotels, offices, hospitals, and all kinds of public buildings provided with conditioned air, where people may live and rest or work in healthful comfort, unaffected by the weather out of doors, protected from nerve racking street noises and dirt which come in through open windows.

In the light of such possibilities it is not strange that many should ask what can be done for the home or private dwelling. The home of the future will in my opinion be heated largely by air warmed by gas or oil-fired furnaces and the warmed conditioned air distributed by noiseless fans. With this type of heating it is a relatively simple matter to attach air cooling by refrigeration, permitting the entire equipment to be located centrally in the basement.

Regardless, however, of the detailed methods of producing these results, I venture to predict it will soon be possible to press a button and place your house-heating system in operation under automatic control, or to press another button to start your house cooling system, as required. This will bring the benefits and comforts of the mountains or seashore to our homes in summer as well as the climate of Florida to our dwellings in winter.

Think what these steps in modern progress mean! We are bringing to our offices, our public buildings, our workshops, our homes, conditions of healthful comfort. Air conditioning combined with the kindred fields of illumination, sun-ray radiation and sound insulation will ultimately add very greatly to the health and well being of the modern city dweller in his daily routine and to the welfare of the nation as a whole.

†Chairman of the Board, Carrier Corporation.

Total and Static Pressures and Efficiencies of Fans

By A. A. BERESTNEFF

CLEAR understanding of the terms "static pressure" and "total pressure" developed by a fan is essential before they can be correctly applied in selecting a fan to do a given job. Unfortunately, these terms are often loosely used and but poorly understood. Let us see if we cannot get to the bottom of the matter and clarify the conception behind these important terms.

It seems to be tacitly assumed that the terms "static pressure" and "total pressure" when used in connection with fans have the same meaning as when we use them to designate the static or total pressure of the air flowing at some cross-section of a duct, for instance. As a matter of fact, while the words are the same, the basic conception is quite different in the two cases. Where these terms are used in connection with air flowing through a duct they designate the pressures (total and static) at a certain point of flow. We can measure them by water gauge, thus getting their reading values directly, or their absolute values by adding the corresponding atmospheric pressure. When we speak of the "pressure of a fan," however, it will be shown that what we are really speaking of is a *difference in pressures* at two points and not one pressure at all.

For this reason the definitions of the total and static pressures at any point of air flow cannot be used as the definitions for the total and static pressure of fans. For example, consider the term "static pressure" and remember the definition of that pressure for a point of air flow as a pressure of compression of air at this point. The static pressure of the fan, as we shall see later, does not represent any compression at all. Moreover, it does not even represent a difference between the two compressions at the outlet and the inlet points of the fan.

In order to make this perfectly clear let us go back to fundamentals and consider just what a fan really does. Fundamentally, the fan supplies the energy necessary to create the flow of air, i.e., the energy necessary to overcome the losses inside the duct system, plus the energy necessary to create the discharge velocity, the latter, strictly speaking, being also a loss of energy but outside of the whole system. Due to the losses, the energy of the flowing air drops. To maintain the flow the fan must compensate for the drop of energy by creating a corresponding difference in energy levels before and after itself (at the outlet and inlet points). The difference in energy levels expressed in pressure units is what we call the pressure developed by the fan; total, when considering the whole energy developed; static, when considering only a part of it.

We know that the total energy at any point of moving air can be relatively measured by the total pressure at this point. Thus, it is clear that to find the whole energy developed by the fan, i.e., the difference between the total energy levels before and after the fan, we have to consider the total pressures at the outlet and the inlet of the fan. Subtracting the second value from the first one, we will have what we call the total pressure developed by the fan. Accordingly, we can state the definition of the total pressure of a fan as the pressure necessary to create the flow of air through the duct system attached to this fan. Or we can call it the difference between the total pressure of the air stream at the fan outlet and the total pressure at the fan inlet.

A definition for the static pressure of a fan is not so easily stated, for the conception is an arbitrary one, being more a practical convenience than a theoretical necessity. To illustrate, let us analyze two simple examples.

Fig. 1 illustrates a fan connected on its delivery side to a duct of constant cross-section with a loss inside the duct equal to 1 in. of water and an outlet velocity pressure = inlet velocity pressure = 0.5 in. water. The lower part of the diagram shows the static and total pressure at various points. The line *A–P* represents atmospheric pressure which we can assume to be equal to 14.7 lb. or 408 in. of water column. On the upper part of this figure, the corresponding total and static pressures are given in absolute values, and on the lower part, in their gauge values. What is the total and what is the static

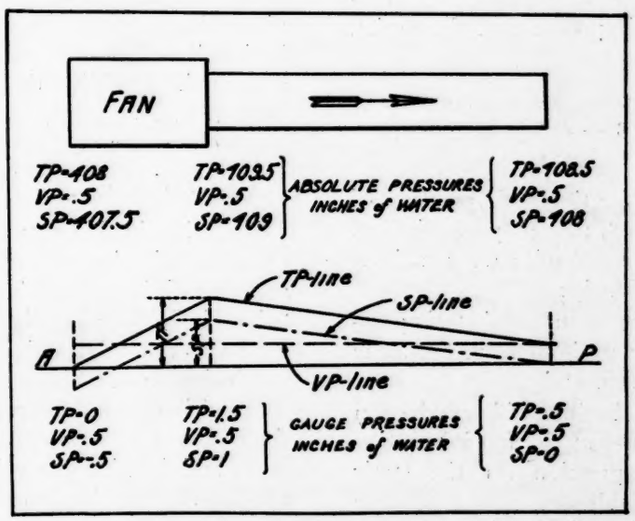
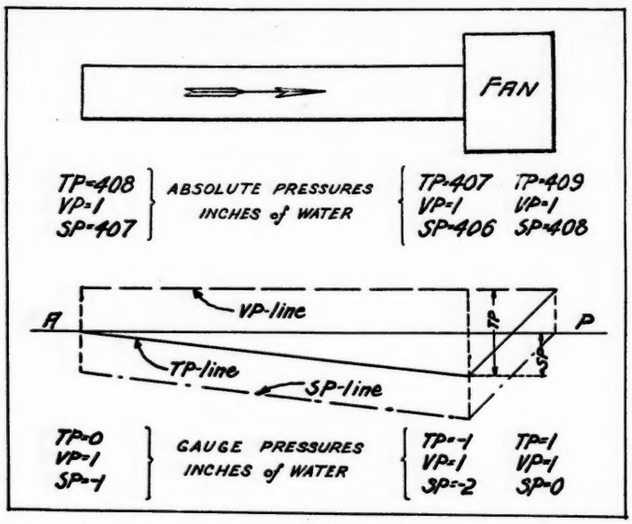


Fig. 1. Fan discharging through a duct. The total pressure and static pressure of the fan are indicated on the pressure diagram by arrows



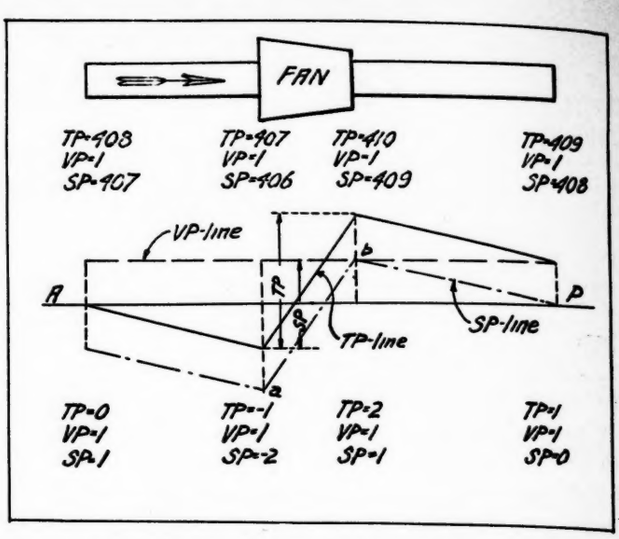


Fig. 2. (Left) Fan drawing air through a duct. Arrows indicate total and static pressures of fan. Fig. 3. (Right) Air drawn through a duct and discharged through a duct. Total and static pressures of fan are indicated by arrows on the pressure diagram.

pressure developed by the fan in this case?

The answer undoubtedly is that the total pressure is 1.5 in. and the static pressure is 1 in.

Considering the numerical value of the static pressure of the fan, which is said to be equal to 1 in., we see that this value could be represented as a result of subtracting the absolute value of the atmospheric pressure from the absolute value of the static pressure at the fan outlet. Remembering that in this case atmospheric pressure equals total pressure at the fan inlet we can write

static pressure of fan = static pressure at outlet — total pressure at inlet = 409 — 408 = 1 in.

Now, take the case shown in Fig. 2, with a duct of constant cross-section connected to the suction and with outlet and inlet velocities of the fan assumed to be equal. In this case, the total pressure of the fan is 2 in. and the static pressure of the fan is 1 in.

The value of the static pressure of the fan can be represented as a result of subtracting the total pressure at the inlet from the atmospheric pressure, which in this case is equal to the static pressure at the outlet. Therefore, we can write

static presure of fan = static pressure at outlet — total pressure at inlet, = 408 — 407 = 0 — (—1) = 1 in.

Comparing the expressions for the static pressure of the fan in both examples, we see that they are similar. From the results of these two examples we can draw two important conclusions, namely:

(1) In determining the total pressure and static pressure of a fan we have to measure both from the same level on the inlet side of the fan, and

(2) This common level on the inlet side of the fan is the value of the total pressure at the fan inlet.

Considering further the expression for the static pressure of the fan and remembering that the static pressure at the outlet is equal to the total pressure at the outlet less the velocity pressure at the outlet, we can write

static pressure of fan = (total pressure at outlet — velocity pressure at outlet) — total pressure at inlet

But

total pressure at outlet — total pressure at inlet = total pressure of fan

Therefore

static pressure of fan = total pressure of fan — velocity pressure at outlet

Now we can state the desired definition of the static pressure developed by a fan as:—the energy necessary to create the flow of air through the duct system attached to this fan less the energy necessary to create the outlet velocity at the fan. Or we can call it the difference between the static pressure at the fan outlet and the total pressure at the fan inlet.

It is clear that it is not necessary to always use the absolute values of total pressure and static pressure at the fan outlet and inlet, for the examples show that the results will be the same if we use the values found from gauge measurements, but we must take care of the positive or negative values of the readings on the delivery and suction sides.

With these definitions we can now pass to more complicated examples. In Fig. 3, ducts are connected to both sides of the fan and the inlet and outlet velocities are equal. Applying the definitions just stated, we get

the total pressure of fan = 410 — 407 = 2 — (—1) = 3 in.
the static pressure of fan = 409 — 407 = 1 — (— 1) = 2 in.

Note that in this case (when the velocity pressure at outlet equals the velocity pressure at inlet) the total pressure of the fan can be measured between the points "a" and "b" (see Fig. 3) as a difference between static pressures at outlet and inlet. The correctness of this conclusion can be shown mathematically.

Fig. 4 illustrates a case when the velocity pressure at the outlet is not equal to the velocity pressure at the inlet, and besides the velocity inside the duct is not constant. According to our definitions

total pressure of fan = 409.5 — 407 = 2.5 in., and static pressure of fan = 408.5 — 407 = 1.5 in.

Comparing this general case with Fig. 3, we see that

here the total pressure of the fan cannot be measured by the difference between the static pressure at the fan outlet and fan inlet because in this case the difference of the static pressure at the outlet minus the static pressure at the inlet (between points "c" and "d") is not equal to the difference of the total pressure at the outlet less the total pressure at the inlet (between points "a" and "b"), which latter is the only true total pressure at the fan.

At this point it would be of interest to mention a rule sometimes used for determination of the total pressure and static pressure of the fan, namely:

$$\text{total pressure of the fan} = \begin{cases} \text{static pressure at outlet} \\ + \text{velocity pressure at outlet} \\ + \text{static pressure at inlet} \\ - \text{velocity pressure at inlet} \end{cases}$$

And

$$\text{static pressure of the fan} = \begin{cases} \text{static pressure at outlet} \\ + \text{static pressure at inlet} \\ - \text{velocity pressure at inlet} \end{cases}$$

(All inlets and outlets are at the fan.)

In the foregoing formulas, all pressures on the right-hand part must be gauge values. Besides, no particular attention has to be paid to the positive or negative character of the readings using only plus or minus signs as they are indicated in the formulas.

A simple analysis of these formulas shows that, while correct in some particular cases, they cannot be applied for a general case. Indeed, assume that two (or more) fans are connected in series, as shown schematically in Fig. 5, and that due to this serial connection the pressures are as indicated. Using the formulas as given above the pressures would be:

total pressure of fan = 2 + 1 + 0.5 — 0.5 = 3 in.
static pressure of fan = 2 + 0.5 — 0.5 = 2 in.

These results are evidently incorrect. The correct answer is in accordance with our definitions:

total pressure of fan = total pressure at outlet —
total pressure at inlet = 3 — 1 = 411 — 409 = 2 in.

And

static pressure of fan = static pressure at outlet —
total pressure at inlet = 2 — 1 = 410 — 409 = 1 in.

Thus it follows that the above formulas can be used only in the case when the total pressure at the outlet and the static pressure at the outlet are positive, and the total pressure at the inlet is negative.

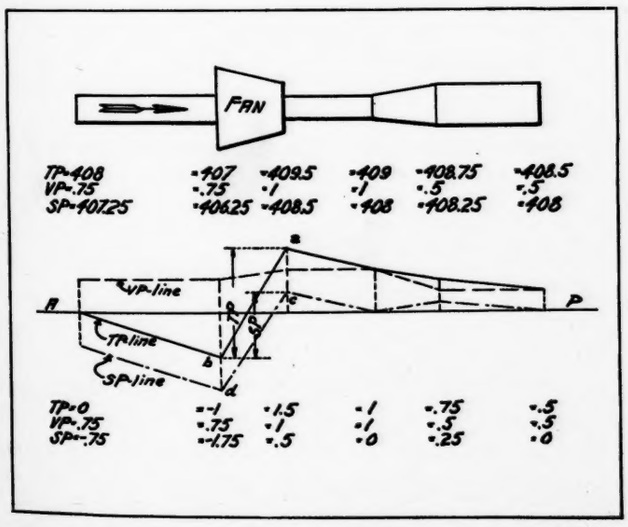
A common mistake in determining the static pressure developed by the fan in cases like Fig. 4 consists of taking two piezometer readings on both sides of the fan and adding them together to find the static pressure. The best way to prove the incorrectness of this is to refer to Fig. 1, and with the help of this example to show that the static pressure at the fan must always be measured from the same level as the total pressure of the fan, i.e., from the value of the total pressure at the inlet.

The writer believes that the easiest and surest way to determine the total pressure of a fan is to measure the total pressure at the outlet and total pressure at the inlet (average values for both duct sections) by means of an impact tube[1] and to subtract the second reading from the first, being careful to take account of the signs. To find the static pressure of a fan, the easiest way is to measure the static pressure at the outlet by a static tube and the total pressure at the inlet (average value) by an impact tube, and to subtract the second reading from the first.

Just a few words of explanation are necessary to tie in the definition of static pressure of the fan as established here with practical considerations.

In the case of a blowing duct (discharge into atmosphere) the static pressure of the fan characterizes the static pressure at the beginning of the duct. In this case the engineer designing a ventilation system has to consider all losses inside the duct. Taking care of an eventual conversion of velocity pressure into static pressure along the duct, he can determine the static pressure at the beginning of the duct. Then, knowing the amount of air to be supplied, he can select the proper size of the fan by the static pressure which is usually given in fan tables.

[1]The term "impact tube" has different meanings. Sometimes it means a simple Pitot tube which measures total pressure, and sometimes it means a tube which measures velocity pressure only. We use the term "impact tube" to mean one which measures the total pressure.



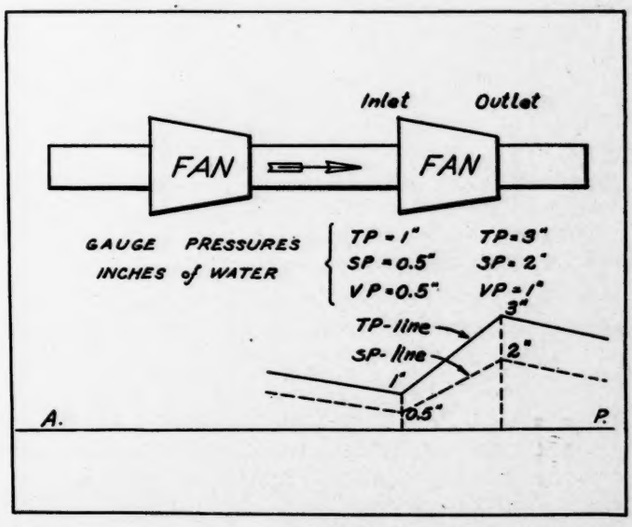


Fig. 4. (Left) The most general and common case. The air is drawn through a duct and discharged through a duct of varying diameter. Total and static pressures of fan are indicated. Fig. 5. (Right) Two fans in series.

For the suction side (if the air is sucked from the atmosphere) the designer has to determine all losses inside the duct system, the sum of which will give the static pressure at the fan. Knowing the amount of air to be handled he can select the fan.

In case the fan is connected to ducts on both sides the designer must find the corresponding values of the static and total pressures on the delivery and suction sides. Subtracting them, the result is evidently the static pressure of the fan, and considering the amount of air to be handled, he selects the fan.

In concluding, let us return once more to the point of the article where we mentioned the arbitrary character of the conception of the static pressure developed by the fan. We know that the static pressure is a part of the whole pressure developed by the fan. The question is, which part? We have taken it as the whole pressure developed less the velocity pressure at the fan outlet because this is the meaning commonly attached to the term in practice. It is clear, however, that there is no absolute necessity for taking this particular part, and that with the same degree of evidence and logic we could take the whole pressure developed less the velocity pressure at the discharge point of the whole system. In this case the static pressure of the fan would represent the pressure necessary to overcome all losses inside the duct system.

After establishing definitions for the total pressure and static pressure of the fan, definitions for the efficiencies of the fan follow at once from the general expression:

$$\text{fan efficiency} = \frac{0.000158 \times q \times p}{\text{hp.}}$$

Where

q = volume of air delivered in c.f.m.
p = pressure against which this air is delivered, inches of water
hp. = horsepower input to the fan

If we are interested in total efficiency, we substitute for p the total pressure of the fan, thus getting

$$\text{total fan efficiency} = \frac{0\ 000158 \times q \times \text{total pressure of fan}}{\text{hp.}}$$

Similarly for the static efficiency of the fan we have

$$\text{static fan efficiency} = \frac{0.000158 \times q \times \text{static pressure of fan}}{\text{hp.}}$$

When giving definitions of the efficiencies of the fan, writers refer to the corresponding pressures without indicating what pressures are meant; those of air flow or those developed by the fan. Now, after we know the difference between both, we realize that when speaking about the fan's efficiencies we always must refer to the pressures of the fan.

Testing Air Flow

VELOCITY readings on ducts are taken with Pitot tube and manometer, the tube being inserted into the duct with the point facing the air stream, and each of the "facing" and "side" connections coupled to either leg of the gauge by means of rubber tubing.

The zero on the manometer should be adjusted and the instrument set level before taking readings, and some such instrument as the two-liquid differential manometer is advisable on account of the ease with which this may be done, since the legs of the tubes are fairly close together, and errors due to setting the gauge slightly out of alignment will not be very serious. It is necessary also to see that all rubber tubing connections are tight.

Care should be taken in selecting positions for taking readings in the ducts, as disturbances in the air stream due to bends, sets, dampers, etc., are noticeable for a fair distance along the duct after the obstruction has been passed.

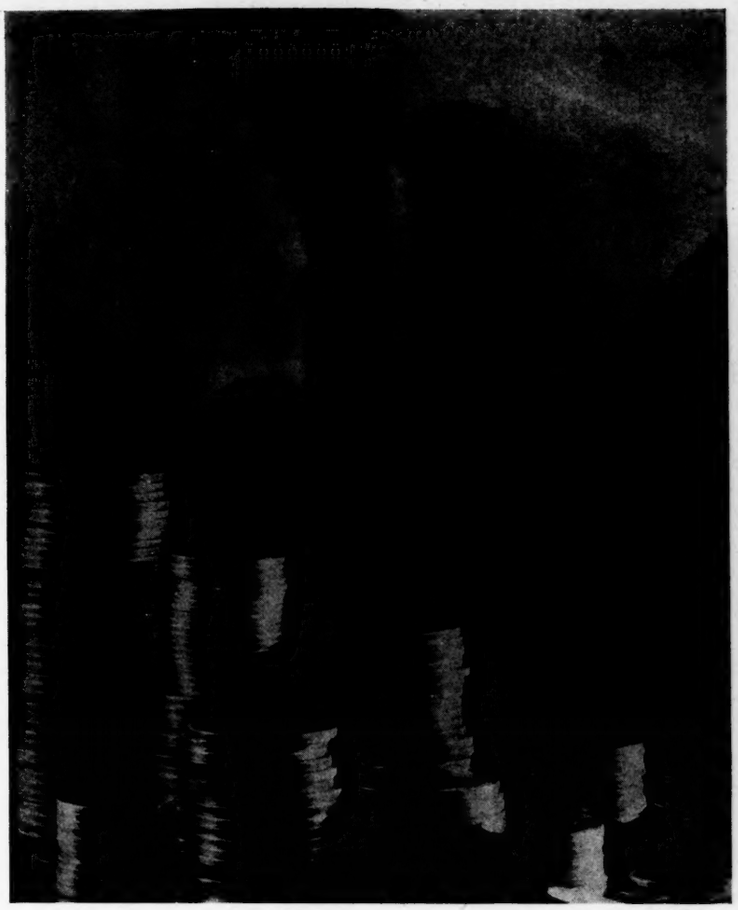
It is usual to take a number of readings across the axes of the duct at each point, the mean velocity being calculated from the total of the results obtained.

In the event of the air flow being very unevenly distributed across the duct section, the total area should be divided up into a number of smaller proportionate areas and the readings taken at the center points of these, the mean velocity being calculated from the results obtained.

A rough traverse of the duct previous to taking readings will indicate which method is required.

The question of taking velocity and total readings at the fan by Pitot tube and manometer is one which is the subject of much controversey as to the method to be adopted. The difficulty arises chiefly out of the necessity in most cases for forming the fan connections to occupy as little space as possible, with the consequence that proper diffusion pieces are often impossible and manometer readings difficult to make and are subject to error, owing to the pulsating movement of the air as it enters and leaves the fan.

It should be sufficient for verifying quantities, however, to take the total head on the fan with the "facing" sides of two Pitot tubes connected respectively one to each side of the manometer, one tube being inserted at the inlet side of the fan and the other at the outlet side, each facing the air stream, and several points being chosen, the average figure being calculated from the totals taken.—*Abstracted from "Testing Air Circuits," by H. J. Knox, in the Journal of the Institution of Heating and Ventilating Engineers, London.*



Galloway

"There is money in modernizing, and we in the building industry must acquaint ourselves with this phase of construction which now makes up such a major part of our business."

An Inquiry Into Modernizing

Confirms Existence of Large Potential Volume and Presents Opportunity for Profitable Jobs

NOW, with new construction at low volume, it behooves all of us to look around and evaluate this idea of modernization at its true worth, to examine the present situation, and to try to determine what the next few months or years hold.

Certainly attention to the subject is growing daily, newly-organized movements are getting under way, government plans are forming, older efforts are taking on a new lease of life, a technique is slowly forming, and there is reason to believe that heating and ventilating engineers and contractors will find modernizing work not only a profitable field but that it may form the avenue leading out of the fog of depression of the past four years into the sunlight of a day where there is work to be done in satisfactory volume.

What Modernizing Means

Modernization is no new idea. This is the simple fact in spite of the impression which can so easily result from the increasing attention paid to it. Heating

and ventilating plants have always worn out and deteriorated and the work of repairing them and bringing them up to date has always gone on.

However, as we use the word now, there are two distinctly new phases which are worth attention. One is the fact that in recent years there is much more reason for modernizing old plants than there ever was and, second, there is equipment available which makes successful modernizing both easier to accomplish and more appealing to the owner of the plant than ever before. The first fact results from economic conditions, and the second is due to the rapid rate at which practices in heating and ventilating have moved ahead in recent years.

What About Volume?

Let us first look quickly over the ground to see if the figures available shed any light on the question of "Is there volume to be had?"

The usual way of preparing estimates to prove that modernization business *can* be secured is either to point to the huge numbers of old buildings in the country, or to exhibit figures available from records of current work. Neither method is satisfactory, for the first merely permits the conclusion that there is a huge backlog, or reservoir of potential work, available to be tapped without regard to the question of time, while the second method is incomplete because there are no trustworthy records of the actual volume of modernization work now current. In spite of these drawbacks an inspiring picture can be drawn by the use of either method. Let us follow each method and see the principal features.

The Backlog

This method begins by considering the indisputable fact that about half the existing homes are heated by primitive means and that their plants are potentially available for modernizing. On top of this is also the undoubted fact that fires, partially or wholly, destroy large numbers of building each year. Then, too, even the more recent buildings are rendered obsolete by advances in the art even more quickly than they ever were before.

Attempts to evaluate these facts in terms of potential modernizing work for heating and ventilating engineers and contractors mean little, for dollar figures not only vary greatly but they result in such enormous figures that few people can comprehend them anyway.

For example, an estimate has been made of 14 billion dollars as the total potential business in modernizing buildings. Even if this figure were reasonably arrived at and reasonable in itself, it is quite meaningless. Why not, therefore, merely let the facts speak for themselves?

Immediate Prospects

While the estimated figures are impressive they are not the point of most significance, for the prospective volume for the current year or month is of more direct practical value in determining a course of action. For this purpose a look at the present situation is enlightening.

Building construction for 1934 is estimated by the best authorities at from one to one and a quarter billions in total. This places the anticipated volume at about one-fifth of that of the peak construction years. Corresponding estimates of how much of this total is in modernizing work are confusing, but one authority places it at 20%.

It is possible to arrive at a rough check on the correctness of an estimate of this kind by considering reported sales of apparatus whose chief use is in connection with modernizing. The total of such items indicates that the 20% estimate is conservative and that there is considerable reason to believe that modernizing work in 1934 will account for upward of 25% of the total business.

Estimates based on statistics thus show two points very clearly. One is that there is an unquestionable potential which can be tapped to produce modernizing work when and if enough effort is put on it to change the potential into actual. The second is that probably one dollar out of every four spent on heating and ventilating in 1934 will go for some kind of modernization.

We should not pass over this point without noting that these estimates have the weakness which statistical studies always have, viz.: they are based on past experience and make no allowances for unforeseen factors. Thus, if a concerted drive were put behind modernizing in 1934 the total value of it, and its percentage relation to the total, might easily be very much greater than any advance estimate can possibly show.

What is Happening

Statistical estimates are all right in their place but what do we find out by a direct examination of the facts? Is there evidence other than figures to show that there is modernizing volume to be had?

The answer to these questions is that there is plenty of evidence. It is of the most convincing kind, for it consists of the experiences and practices of those who are finding this kind of work and who are quietly going about getting it while others are hesitating. Let us look at some of this evidence.

Here is what is happening. Banks, mortgagees, insurance companies, and others have acquired by foreclosure a vast number of buildings they did not want. Their experience with these properties has not, on the whole, been a happy one, for with a few notable exceptions these institutions were not and are not now equipped properly to operate and maintain buildings. Some of them have helped themselves out of an embarrassing position by investing further money in such properties by modernizing, thus increasing the rentability of the properties. Too, some have found that by advancing money for modernization they have saved themselves from the necessity of foreclosing and having an unwanted burden on their hands.

Such modernization has been of all kinds—painting, improving heating and plumbing, alterations in rooms, and so on. It is a fact, however, that heating has not received its proper share of attention. Much modernizing has been of the kind that is impressive to the eye,

and since one way of judging a modern heating system is by its unobtrusiveness, heating has been neglected. The idea of modernizing so that it makes the greatest showing to the eye is one that is confined generally to buildings where it is desired to impress prospective tenants. Naturally, this is not the case where the building owner is modernizing for his own comfort. It is undoubtedly true that promotion of modernization is badly needed to appeal to building managements, particularly since they are the ones at the present time not keenly interested in such unspectacular work as heating.

While this is true in general, it is not true of some of the more careful management concerns, which are taking over many old buildings and having them modernized and divided into many small apartments. This means altered heating lines, the addition of valves and insulation, a new boiler, stoker, oil or gas burner; anything that is likely to produce buildings in which there will be no vacancies or buildings that can be sold at a profit. The operators know that vacancies are the rope that hangs the profits that might be secured from such structures. They are willing to spend money for modernization because they know they will get it back with interest.

Barbers, beauty parlor proprietors, doctors and dentists know that they can increase their business with the help of air conditioning. Women avoid hot, stuffy stores and theaters in preference to those properly conditioned.

Non-rentable apartments in poor city neighborhoods appear more responsive to modernization than similar structures on avenues tenanted by the elite. Run-down suburban homes that have been untouched by hammer or Stillson for the last five years contain a full assortment of heating work that must be done to prevent positive collapse of their heating systems.

City laws and ordinances in some cases make it imperative for laundries, lofts, theaters, stores, and restaurants to ventilate by fan. Smoke nuisance regulations have sped the use of automatic heating, air washers, and dust filters.

Residence modernizing work is still responsive to the appeal of new, good-looking and modern equipment. While ease and luxury are not as strong arguments for residence modernizing as they once were, automatic and labor-saving features still have a strong appeal. Dollar-saving arguments are much more in order in homes than formerly and decrease in operating cost through modernizing is now a powerful argument even in the home.

This work on modernizing is going on all about us and should prove the convincing reply to any possible doubt left lurking in the mind by a mere quotation of statistics. However, we look at it, the conclusion is inescapable that modernization work in volume is with us right now. It does not have to wait on government help or on organized drives or campaigns, although these would add greatly to the volume.

What is Included

"What does this work consist of?" is a question often asked. The reply is that modernization has a thousand ramifications. Certain lines of work as, for example, changing one-pipe to two-pipe steam systems, placing gravity hot water systems under pressure, adequate trapping and valving, addition of automatic controls of many kinds, insulation and air conditioning have progressed importantly of late. They will, perhaps, lead the modernization procession. One might also cite replacement of old-style high, exposed or recessed radiators with convector radiators.

Fuel-using apparatus which permits better economy, or adapts itself readily to automatic operation, is still much in the limelight. The more than 50,000 oil burners, 14,000 stokers, and well over a million dollars worth of gas-fired boilers and burners installed in 1933 all go to show how important this fuel-using equipment is. While all such equipment does not go to modernizing, still by far the greater part of it does.

Air conditioning, and especially summer cooling, is perhaps the greatest unknown quantity in the picture. Last year a considerable part of the equipment installed went into existing buildings and became, in effect, an effort to modernize these buildings. A surprising range of building types and applications were included, and while the number in each type is not now large, these pioneer installations are being closely watched. Now that there is a great variety of air conditioning equipment available, much of which was designed with an eye to its possibilities for installation in existing buildings, there is reason to believe that modernizing by the use of air conditioning will come along faster in 1934 and succeeding years than it has heretofore.

This great diversification in the kinds of modernizing going on, and in the reasons for doing it, together with the huge potential are what make close attention to it on the part of engineers and contractors so imperative. No kind or class of equipment is ruled out, no stone wall of a saturated market is in sight, there is no monopoly of knowledge or methods, and the possibilities of the movement constitute an open invitation to the talents of everyone.

Several drawbacks have tended to retard progress and have no doubt discouraged many who have made attempts to find this modernizing business. One is just a plain lack of technique or the "know-how." This has many aspects and includes lack of standardized methods of installation, estimating, selling, and financing.

The other major difficulty has been that of adjusting the mental attitude. Modernizing work often consists of a small job—not the $50,000 contracts of 1929. Their very smallness gives them the appearance of unimportance. On the other hand, many of them yield better returns for they are not obtained by destructive competitive bidding. All this means that a change of attitude and of operating methods are required to set up an organization to take full advantage of modernizing.

After all, these are comparatively slight obstacles and when there is really a will to get into modernizing work, many engineers and contractors have found satisfying returns from it. Don't turn it down, it may hold equally good opportunities for you.

WHAT WILL I USE FOR MONEY?

Before any modernizing job can actually go ahead the building owner must be able to pay for it. He, it is, who ultimately furnishes the wherewithal to enable the engineer to collect his fee, the contractor to pay his help and meet the cost of his equipment purchases. All this is so elementary that it seems foolish to repeat it. But the fact is that many a job has failed to materialize because of this one trouble. Everything goes well until the owner raises the question "What will I use for money?" It arises in nearly every case and the success of the engineer or contractor who goes in for modernizing work hinges on his ability to furnish a satisfactory answer. The question of finance is vital to modernization.

This being so, it is also essential that everyone who goes after modernization jobs has a pretty clear idea of just how he can go about furnishing the answer to this persistent question. There are answers—and practical answers—as evidenced by the fact that suitable plans are in everyday use by those who are now engaged in this work. Our present object is to analyze the situation and to outline these plans to such an extent that this application may be understandable.

Part 1

The Owner Who Needs No Help

THE simplest case, but unfortunately one that occurs all too rarely, is that where the owner has private resources to draw on and needs no outside help. To him the question of "what shall I use for money?" is practically non-existent. The problem is to convince him of the desirability of using it for modernizing instead of for some other purpose.

If we were to put too much meaning on all the recent discussions of proposed plans for helping out building owners by the use of public or private credit, we might easily be led into concluding that there is no such person as a building owner who is so fortunate as to possess cash resources. As a matter of fact there is plenty of evidence to show that there are still, and have always been, owners who can finance themselves without any outside assistance whatever. Let us outline some of this evidence.

Private cash resources are largely evidenced by savings bank deposits. These have reached a total seldom before equalled. Some savings banks are actually embarrassed by the amount of their deposits. Some have placed limits on the amounts which they will receive from any one depositor. Interest rates to the depositor have been reduced in some instances and a general policy of reducing these rates is under discussion. This situation reflects the management's inability to place loans at advantageous terms and their conclusion that they cannot encourage too large sums so long as this condition continues. Recall that these deposits are in no sense the property of the savings institution which merely has custody of them for the time being. They really belong to the depositor who may withdraw them and dispose of them at will. If a depositor is convinced that it is to his interest to withdraw his cash and use it for modernizing his heating plant he will do so. No borrowing or no so-called "financing" is involved. The transaction is exceedingly simple.

Merely because these private funds are in existence and *can* be used does not, however, prove that the owners of them are also building owners nor does it show that where they are building owners they can be induced to use these resources for modernizing purposes.

Will Owners Spend?

To show that there must be a substantial number of building owners among them one need but note how many depositors there are in savings institutions. With so many, and with building ownership as widespread as it is, it follows that a considerable number of building owners are also owners of cash resources in the form of savings deposits.

As to whether or not they can be induced to use these resources for modernization we need only examine the results obtained by the organized modernizing campaigns conducted in many communities during 1932 and the early part of 1933. Under local and Federal auspices such campaigns were conducted in some 175 cities. The total amounts spent are unknown but records reported in 84 of them show that $87,928,335 were spent for modernizing. In Philadelphia alone over $20,000,000 was reported. Recall, too, that these campaigns were carried on in the darkest days of the depression. The writer asked one considered an authority "How was this financed?" "Privately financed," he replied. "No

special loans were made in general. The owners had their own funds and they *spent* them."

This is ample evidence that not only are all owners not impoverished but that under proper conditions they can be induced to actually use their resources for modernizing work.

It is worthy of note in passing that the proper conditions in the case of these campaigns were brought about by definitely organized local effort. There are a considerable number of people who believe that these campaigns definitely showed what *can* be done and who contend that the best plan which the government could put behind encouraging the construction industry in general would be to lend its support to similar campaigns again. This thought is what is behind proposals for reviving this general idea. More details of this general plan will be discussed later.

Engineers and Contractors Can Help

In the absence of any general plan we are left to individual effort to find owners who need no help in financing and whose heating plants need modernizing. In other words, while we know that these cases exist, just what is the individual engineer or contractor going to do about it?

There are several things he can do. One is to continue to agitate for a general plan with government support and to lend his aid and assistance to promoting its consummation. At present this has to be rather passive but need not be ineffective. Talk up the idea whenever and wherever the occasion permits. Then, since owners of this kind are undoubtedly the cream of the potential, use your best efforts to locate them. This may come from knowledge of local conditions or it may be necessary to use some kind of survey. Some of the most successful operators have used methods of this kind to good advantage and details of how they have gone about it will be described later.

In general, the class of work where the owner can be found who has cash resources is in the residence type of building. Here the dollar expenditure per job is modest, running to amounts less than $1000. To do this kind of work to advantage requires a suitable organization and a well set-up plan of procedure.

Money Institutions as Owners

Another, and specialized, case where the owner can arrange his own financing is in the case of investing organizations who are also building owners. Most prominent among these are banks, insurance companies and similar organizations. In some cases they are building owners through deliberate choice in that they must house their regular activities. In addition, they are now the owners of many buildings which they had no intention or expectation of ever owning. A good many of these holdings are apartments, hotels, and office and other commercial buildings in cities. They represent the proceeds of these institutions having gone in for loans on real estate, and came to their present owners as bond or mortgage holders following default and foreclosure. In many cases, in fact probably in the majority, the institutions would like nothing better than to sell these properties. Where they are not able to do this they must perforce become operators and managers. These institutions represent an especially worthwhile group of potential modernizers. Not only are they able to finance any such operations but many of them are coming to realize that modernizing is their one hope of attracting enough rentals to produce sufficient income to carry the investment while the buildings are in their possession. They are also coming to realize that modernizing makes salable a building which otherwise cannot be disposed of.

So far as the buildings which these institutions use for their own organization purposes are concerned they react to modernization, and regard it in the same light, as an owner of any other commercial building. They will modernize where and when it can be demonstrated that it pays. Where they differ from many others is that they can do their own financing. The buildings where they are more or less involuntary owners present a peculiar class by themselves and the reason for modernizing is peculiar.

Estates as Owners

Another class of building where the owners can themselves arrange for payment are those owned and operated by estates as a permanent business. While there are not so many of these, still their holdings in the aggregate are large and noteworthy to the engineer or contractor interested in modernizing. Many of these organizations follow a deliberate policy on modernizing, have ample funds, and aim to keep their holdings in attractive enough condition to produce a maximum income.

Here, then, are large and extremely important groups of owners who do not present the question of finance as an unsurmountable difficulty. So far as known there are no figures to show the amount of their holdings. None are really necessary. It is well known that the amount of foreclosed or defaulted real estate is so huge that it has become a matter of national concern. It is also well known that those engineers and contractors who are making a success of modernizing work are getting a considerable part of their work from these groups. It is a safe and conservative estimate that there is scarcely a savings bank or insurance company in the country which does not possess at least some of this kind of property.

Job of Selling Needed

What does the situation mean to engineers and contractors? It means that here is a preferred group of building owners who can be confidently expected to look favorably on modernizing. What is needed to produce actual jobs from this situation is not more finance, not any government urging, not any waiting for some one else to start things moving, but a realization of the possibility and a determination to go after it.

$20,000 Worth of Contracts in One Modernizing Job

By JOHN A. MASEK

Cast iron and copper surface, replacing pipe coils, brings up-to-date the plant in the Chicago Public Library

WHEN the building of the Chicago Public Library was erected its four-story height dominated the whole neighborhood. The heating and ventilating plant was a model of its kind, with its fixed air intake at the first floor on the boiler room roof, its high-pressure boiler plant with its own electric generator, its spray-type air washers with eliminator plates, its pipe coil heating apparatus at the washer, and its provision for circulating washed air through ducts to all parts of the building. Moreover, it was somewhat of an innovation at the time and was news, for the *Chronicle* during September, 1900, captioned an article "Air in Library Washed." The writer told how dust and odors were removed from the air at the washer and mentioned the large amount of dust and mud found in the bottom of the washer after it had been in use for a short while.

This plant has now seen 36 years of service and during that time not only has the plant itself changed, but so has the whole neighborhood. Several high buildings have been built around it with the result that the Library building is now more or less "pocketed" by its neighbors. Some years ago proposed repairs to the boiler plant made it necessary to decide whether to continue to generate steam for producing electricity or to swing over to the practice of buying electricity from a utility company. When this latter was finally decided on, the boiler plant was left with the function of furnishing steam for heating only and was converted into a low-pressure plant. The effect of this change was that whereas the pipe coil heaters had been designed and intended for receiving high-pressure steam the temperature of their surfaces was considerably lower when the low-pressure steam was supplied to them.

In recent years the operating staff found it increasingly difficult to keep the building properly heated during cold weather. This was aggravated by the fact that the original preheating coil had been none too large at best. Finally, things reached such a pass that when the outside temperature dropped to 20° above zero it was found necessary to take the air washer completely out of service, stop the circulating pumps, and drain the water from the washer, with the result that during cold weather the air circulating through the library could not be washed or cleaned.

As years passed, the natural wear and tear on the system also began to make itself felt. Minor leaks developed in the washer casing and the copper eliminator plates began to corrode and to gradually give way. Moreover, leaks at the preheater and reheater coils put in an appearance. As a result of all these conditions, it became increasingly difficult to operate the plant to the satisfaction of users of the library. With the fixed louvers at the air intake of the original plant it was not possible to close the intake and the high neighboring buildings caused a down-draft of air which would pass through the system and out through the roof ventilators in spite of anything that could be done. It seemed evident that repairs and remodelling simply must be undertaken.

When the problem of suitable repairing came up it was evident that repairs or modernizing should be done at three places. Namely, new and modern preheating surface should be installed instead of the old pipe coils; that repairs at the reheater would be necessary where failure had occurred, and that since new and improved spray nozzles were available their use seemed desirable. With the program once determined it was undertaken in steps.

First of all, the old pipe coil reheater was cut out with acetylene torches. During the course of this work it was found that the center coils had become completely stopped up with dirt and dust to the point where no air at all could pass between them. Here, then, was additional reason to account for the difficulty of maintaining temperature. It was not, however, until the coils were actually torn out that this condition could be shown to exist. The old reheater coils were replaced with fin-type copper surface totalling 44,560 sq. ft. of equivalent surface. The use of copper was decided on because of space limitations since these heaters could accomplish the same effect at a very great saving in space. New sheet metal casing was built around them and since that time the former difficulty in heating has not been experienced.

There remained the question of a suitable preheater. After consideration it was decided that cast-iron surface would be well suited for this job on account of its ability to retain heat. The space occupied by the old preheating coil was found insufficient to accommodate the new preheater. This made it necessary to look around for a new location. It was found that the best arrangement was to locate the new preheater on the boiler-room roof in front of the old air intake louvers. These louvers were removed entirely, a suitable steel foundation was erected, and the cast-iron heaters were installed thereon, housed in a suitable shelter connected

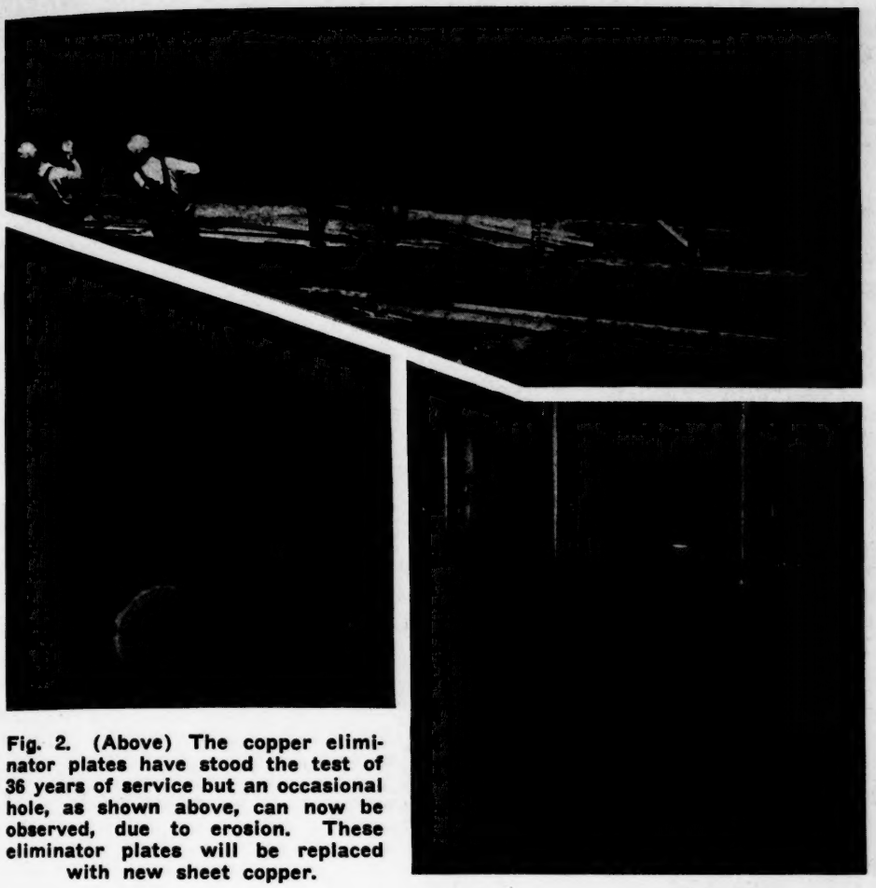


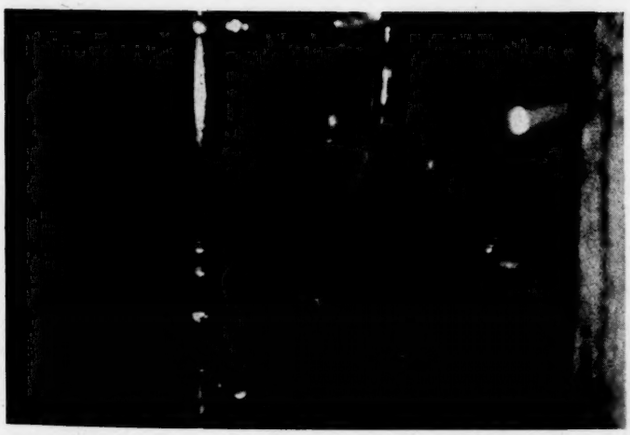
Fig. 1. (Left) The cast-iron radiator surface is shown in place, with the housing angle iron being erected.

Modernizing a Public Library's Conditioning System

Fig. 2. (Above) The copper eliminator plates have stood the test of 36 years of service but an occasional hole, as shown above, can now be observed, due to erosion. These eliminator plates will be replaced with new sheet copper.

Fig. 3. (Left) Interior of the air washer, showing the good condition of the brass piping after 36 years.

Fig. 4. (Right) The old air intake with louvers removed. Steel channel iron is set on the roof of the boiler room on which the heating surface and housing are mounted.



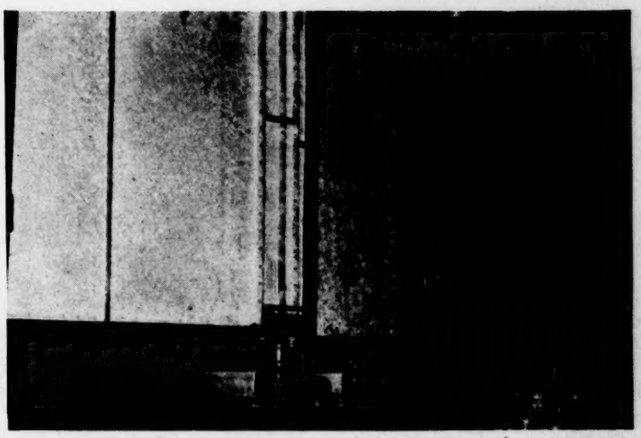


Fig. 5. (Left) The long years of service of the air washer are showing on the copper eliminator plates which are giving away. Fig. 6. (Right) The old reheating piping coil heater occupied the whole space shown by the new galvanized sheet iron surface. Copper extended surface of equal capacity occupied only the small middle portion shown in the center of the illustration.

to the air intake. New adjustable louvers were installed in front of the preheater to replace the old ones. They were rigged up so that their position could be adjusted by the operator from the basement floor by the use of a hand-operated windlass. Installation of the preheater was completed only recently.

Since that time, however, there has been ample opportunity to check up on its adequacy. During the past winter it was found that on a day when the temperature was 5° below, the desired temperature at the air washer could be easily maintained. In fact, on this particular day the washer temperature was 54°. This indicates clearly that the new preheater has solved the former difficulty of having to shut down the washer during cold weather.

Repairs at the washer have not yet been made. When the copper eliminator plates were examined it was found that they had corroded to some extent and that they were giving way in places, but when it was recalled that they have been in service for 36 years it was decided to replace them again with copper. The brass pipe inside the washer is still in good condition in spite of the long period of service. The spray nozzles in the washer are now considered obsolete and it is planned to install nozzles of modern design.

When this work is completed it will have cost close to $20,000, but Walter C. Wagner, chief of the operating staff, feels that this cost has been well justified. Even now with the entire project not quite completed, cold draft complaints have disappeared and this in itself is evidence that the expenditure is worthwhile.

Contractors on the installation were Graves & Graves, Inc. Vento cast-iron radiation was used for the preheating, and Trane surface for the reheater coil.

Here is an example of how a heating and ventilating system which was the last word 40 years ago has been modernized at a moderate expenditure. No doubt there are thousands of other similar installations throughout the country. Just as it was difficult, however, to find out what was causing the trouble in this plant so, too, it is troublesome to find exactly whether modernizing should be undertaken in lots of jobs. The moderate effort required, however, is well repaid in the work made available.

Large Market for Heating Plants Disclosed by Survey

AS we go to press, tabulations on 10 cities have been completed by the Bureau of Foreign and Domestic Commerce in its Real Property Inventory, covering 64 cities. However, all of the data are not yet available on the 10 cities, information on heating in residential building being at hand only for two towns—Casper, Wyo., and Columbia, S. C.

The following table shows the number of dwellings in the two cities classified according to the type of heating and fuel used.

Type of Heating	Casper	Columbia
Warm Air	1110	1130
Steam or Vapor	525	369
Hot Water	362	610
Stove	3584	4502
Other	....	5458
None	31	28
Total	5612	12,097
Fuel		
Coal	2470	8036
Wood	32	3801
Gas	2955	10
Oil	12	81
Other	100	76
Total	5569	12,004

The following table shows the distribution in these two cities in percentage of the total:

Type of Heating	Percentage
Warm Air	12.7
Steam or Vapor	5.1
Hot Water	5.5
Stove	45.5
Other	30.9
None	0.3
Fuel	
Coal	60.0
Wood	21.7
Gas	16.8
Oil	0.5
Other	1.0

The second table shows that 76.7% of the dwellings in these two cities are heated by stoves, fireplaces or other methods of heating or have no heating.

Surprising information was unearthed regarding the condition of buildings, duration of occupancy and vacancy, the extent of crowding, and the type of mechanical equipment used in the surveys made in both cities. The following table, for example, shows the conditions of the buildings in the two cities:

Condition of Structure	Casper	Columbia
Good	28.6%	32.9%
Needs Minor Repairs	45.5	46.2
Needs Structural Repairs	19.8	19.1
Unfit for Use	6.1	1.8

When completed, the survey will supply data on which to base estimates as to the extent of crowding and doubling up, which has been a matter of some controversy for the past number of years. In the two cities for which figures are completed, we find the following percentage distribution:

Extent of Crowding	Casper	Columbia
Very Spacious	23.2%	20.8%
Spacious	24.8	22.6
Adequate	31.4	25.6
Crowded	18.9	25.6
Overcrowded	1.4	4.3
Greatly Overcrowded	0.3	1.1

The real property inventory was a door-to-door survey made by unemployed architects and engineers and was completed late in February. Since that time the Department of Commerce has been busy compiling the statistical information from the reports. Complete data on the heating will appear on these pages when the survey is completed.

Government Plans to Aid Modernizing As Well As New Building

Features of "Walker Plan" expected to be adopted soon

GOVERNMENT action to stimulate private building construction is on the program for this session of Congress. With Congress expected to adjourn shortly it is apparent that whatever is to be done must be done within the next few weeks. Some observers predict that a detailed program and the necessary enactments will be presented by the Administration and passed through Congress by the early part of this month.

It is still difficult to get reliable information as to the features actually to be included. Announcements are guarded and a good many obvious "feelers" have been put out to get public reaction.

Just what prompts the decision to advance a program at this time is unknown, but there seems little doubt that the criticism directed at NRA by the capital goods industries in March had a good deal to do with it.

Multiplicity of Plans

There has been no lack of planning to help building construction. Plan after plan has been advanced; discussion has followed discussion; programs have been outlined, completed in some cases, abandoned in others. Month after month there has been hesitation and doubt as to just what should be done. It is not at all apparent that everyone is agreed even now. Several features are still undergoing discussion. However, consensus of opinion is that the present government program will finally contain what is known as the "Walker Plan." This takes its name from Frank C. Walker, director of the National Emergency Council. This plan has for its primary purpose the revival of building construction and to encourage private investment in the building industry.

The Walker Plan

It is expected that actual carrying out of the plan will involve two separate parts. One is a campaign plan to stir up public interest in remodelling, modernizing, and repair work. This is to be aimed especially at homeowners and it is predicted that a nation-wide organization of committees will be built up. The general plan most discussed is that the local organizations will be modelled closely on the plans which were worked out in connection with the "Renovise Philadelphia" campaign carried on in 1932.

In order to give the proposal added attractiveness to the homeowner and to get him to undertake the work at once, it is proposed that he be given concessions in material prices and labor costs. Supposedly, these benefits would be allowed only to those who take part in the campaign, would be restricted to certain classes of buildings, and the work would have to be undertaken within a specified time. There is no definite indication that this feature of price concessions will actually be in the plan when it emerges from Congress as it is well known that the building trades unions are opposed to any reduction in labor rates. There is also known to be opposition on the part of some manufacturers to offering price concessions on equipment.

A third feature of this part of the plan is the proposed method of financing the work. The way most favorably discussed is that some government agencies will offer a plan of insuring or guaranteeing mortgage loans made by private capital. For modernizing work these loans would range from $200 to $2000, repayable over a period of from two to five years. Exact details of this plan are by no means clear as we go to press. Neither is it at all evident which government agencies are to be designated to take over the work.

Loans for New Building

A second part of this "Walker Plan" is concerned with new construction. It contemplates setting up machinery for making mortgage loans available. One proposal is that financing on new construction be done on a basis of one mortgage loan, eliminating second and third mortgages. It has been suggested that if standardized requirements can be drawn up, private agencies can lend on a first mortgage up to 70% or 80% of the entire cost of the building. This first mortgage would be insured in part by an insurance corporation set up with government funds. This feature of the plan is the one confidently expected by its sponsors to give a real impetus to new construction. The latest pronouncement, however, raises doubt as to whether this feature of the plan will be included in the Administration's present proposal. If it is not included, then the plan becomes almost entirely one for the promotion of modernization work.

A number of government agencies are interested and eligible to supervise this plan. It is generally believed that Mr. Walker would be made head of the movement. It is also rumored that General Johnson is to be transferred from NRA to take an active part in the publicity drive. No confirmation of this has ever been obtained and General Johnson has repeatedly denied any intention of leaving NRA. The very fact that the rumor persists, however, indicates the importance of this general plan to revive building construction during the present summer. If the plans carry through, it is hoped that the drive will do for the construction industry what last year's NRA and Blue Eagle campaigns did for the consumption industries.

Pipe Welding Pays . . .

In New Construction as well as Rehabilitation

By F. G. OUTCALT†

Fig. 1. Producing a smooth bend in small diameter pipe with the aid of the oxy-acetylene flame.

MANY new processes and methods for fabrication and construction have become available to the builder in the last 20 years. Probably the most revolutionary of these is the joining of metals by welding.

In piping—the part of a building's make-up most commonly installed with welded joints—there exists a splendid example of the advantages welding has contributed to the more effective use of steel and other metals. Welded pipe joints are equal to, if not better, than the pipe itself as regards thickness, strength, and resistance to corrosion; frequently, this means that thinner walled pipe will be suitable. Construction costs are generally lower because welding expense is closely in proportion to the wall thickness and diameter of the pipe—quite in contrast to the expense of mechanical joints. Welded joints permit more logical streamline layout, and resistance to flow is greatly decreased. There is no maintenance problem since welded joints are as permanent as the pipe itself.

Translated into terms of present-day problems, welding aids in building construction and rehabilitation through decreased first cost in most instances and by giving definite assurance of lower operating or maintenance costs. In rehabilitation, existing materials may be salvaged and refabricated by welding at small expense. And though welding has been used chiefly in the construction of larger buildings, its application in the smaller structure is just as sound. Contractors and fabricators are now familiar with practices that permit economical work on jobs of whatever size.

It is probably on the fabrication, installation, and alteration of the various piping services in buildings that the most immediate and substantial benefits of welding are to be had, whether in new construction or reconditioning work. Welding is now definitely established as the standard method for piping installation in large building and engineering projects. Its general adoption for the smaller job—even residences—will bring the same advantages that have been realized in the larger structures.

†The Linde Air Products Company.

Fig. 2. (Left) Portion of welded steam piping system showing: a riser connection at the left flush with the bottom of the 5-in. main, a type of construction permitting draining of the main and at the same time preserving all possible headroom; a spring piece between the riser and the connection into the main, allowing for expansion and contraction from the riser anchorage five floors below; and a method for anchoring the main by means of a pipe strut welded to the main on one end and to the flange of a girder on the other. Fig. 3. (Right) Boiler room piping showing the use of welding elbows. Note that the elbow between the valve and boiler header is welded into the top side at an angle of 45°. This provides an additional 5 in. of headroom which was very badly needed in this case. Welding neck flanges are also illustrated.

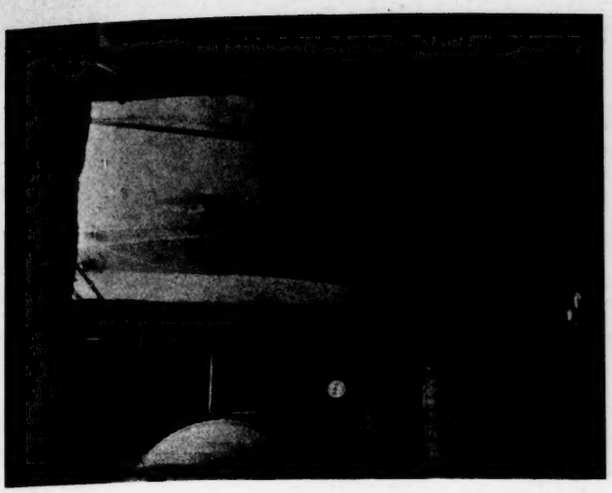


Fig. 4. (Left) Boiler room piping, showing streamline construction possible where welding is employed. Fig. 5 (Right) Return water and equalizer piping near the base of a boiler.

Quite obviously it is to the advantage of the owner to have as much as possible of the piping — heating piping, for instance—installed by welding, for though a faulty joint in small diameter pipe is more easily fixed than in larger pipe, the initial trouble may mean just as much damage. Although the average contractor assumes that the same economy of installation cannot be secured with small diameter pipe, let us say under 2 in., as with pipe of larger diameter, this is not necessarily the case. There have been several instances in various parts of the country where heating contractors have found it economical, through careful organization of labor on the job, to weld all sizes without exception. Their workmen are trained and equipped to handle piping installation by a single method—welding—and they work quite efficiently as a result.

In one case, a contractor in a large eastern city was doing an extensive business in a highly competitive, small apartment house field. Much of his work with heating piping involved alterations, and it was his practice to weld all joints, except of course at valves. His success in handling the smaller diameters resulted chiefly from an efficient method worked out for making changes in direction—generally the most time-consuming element with small pipe. Sizes under 1½-in. diameter were bent cold in making turns, much after the manner of installing electrical conduit. The 1½-in., 2-in., and 2½-in. sizes were bent with the aid of the oxy-acetylene flame. A length of pipe would often be placed with three or four turns in about 15 ft., at an impressive saving of labor over other methods. That this type of construction gives improved efficiency with respect to flow would hardly be questioned.

Even with larger diameter pipe, economy of installation by welding is coming more and more to be a matter of organization in handling the work. The proficiency of workmen in the actual welding of the joints has been increasing with a more extensive use of welding, and will be much greater within the next few years.

An improved method of oxy-acetylene welding introduced into the field of overload pipe line construction several years ago has resulted in tripling the number of welds made per welder per day. For example, as high as eighty 4-in. welds per 9-hr. day have been made under the best field welding conditions. Only a portion of this production could be obtained on the average building job, of course, because of the vastly different working conditions. This figure does indicate, however, that organization of the work is of greatest importance —not the actual time and material expended in making a single weld.

Expansion and Contraction

On the smaller jobs, piping layout to take care of expansion and contraction for all sizes of pipe is relatively simple. Layout is made as though flanged joints were to be used, and the natural flexibility of the pipe is depended upon to allow for movement. Where the length of pipe at right angles to a long main or riser is not sufficient to take care of the computed movement in bending, the length should be increased by a change in layout, or an expansion loop made up by welding should be inserted at some point in the run.

There is, therefore, nothing impracticable in a piping job with the smaller sizes welded, and there is much to be gained by having a foolproof, reliable system with increased efficiency of flow. To this end, it merely remains for the architect or engineer to call for bids in a manner insuring the greatest amount of welding possible for the sum alloted to the piping system. In other words, the contractor is required to disclose in his bidding what portion or sizes of the piping he will install by welding at no greater cost than for mechanical joints, and to give a differential, if any, for welding any given portion or all of the smaller piping.

Classes of Piping

Piping services for which welding has been found practicable thus far are steam, hot and cold water, refrigeration, air, gas, and sprinkler piping. Five classes of pipe materials are usually considered: steel, wrought iron, and alloy iron; these same materials when gal-

vanized; copper, brass, and bronze; cast iron including alloy cast iron; and lead.

Steel, wrought iron, and alloy iron are usually welded with a low alloy steel welding rod, and the operation is so generally understood as to require no further discussion. These same materials when galvanized present no welding problem, but if it is desired that a minimum of the galvanizing be lost at the joint, bronze-welding should be used.

Copper, brass, and bronze are best bronze-welded, but these metals may be fusion-welded if the service requires. Brass pipe as large in diameter as 12 in. has been successfully joined with bronze-welding, with the same simple joint preparation as employed for steel pipe. Fittings for joining with soft solder are generally used for the smaller diameters.

Cast iron and alloy cast iron are also best bronze-welded, although alloy cast iron is sometimes fusion-welded if the service requires. Provision must be made for expansion and contraction by means of flexible or expansion joint with this class of piping, and hence systems cannot be solidly welded. Ordinarily, only line joints are welded.

Lead pipe is joined by "lead-burning," a means of fusion welding this material in use for many years, and requires no further comment.

Alteration and Repair

The advantages of oxy-acetylene welding and its companion oxy-acetylene cutting in alteration and repair have always been widely recognized. The simplicity of replacing a faulty joint or section of piping by cutting it out and welding a length of pipe in place is obvious. Similarly, mechanical fittings can be replaced with a corresponding welded or welding fitting.

In connecting a new branch line to an existing main or riser, a welded branch connection is made for a fraction of the expense of any other method, to say nothing of reducing time for shut-down if the system happens to be in use.

Old piping to be replaced is quickly cut into serviceable lengths for re-use in the same system or elsewhere. Pipe too badly corroded for threading, but still good for many additional years, can be put back into service only by means of welding.

Standard Practices and Specifications

Standard pipe welding practices for the guidance of inspector and contractor are available in handbook form, and assistance with any special problems is freely given by certain companies supplying gases for welding. These standard practices can be referred to in specifications, if desired, but generally it is sufficient to include certain basic requirements, leaving the actual manner of execution to the judgment of the contractor.

Requirements to be included in specifications concern:

1. Extent of welding, as discussed previously.
2. Welding process to be employed.
3. Make of welding rod to be used for each service or class of pipe.
4. Qualifications of the welders for the class of piping to be welded.
5. Design and preparation of line joints for welding.
6. Flanges—type.
7. Fittings whether to be fabricated by welding, or to be the type manufactured all ready to be installed by welding.
8. Final acceptance test.

Model welding specifications including these points are available, and as mentioned before, assistance is to be had for any special problems that may arise.

Conditioned Air Preserves Books

INVESTIGATIONS conducted by the Bureau of Standards, U. S. Department of Commerce, have shown that sulphur dioxide is generally present in city air in concentrations sufficiently strong to cause damage to vegetation, cotton fabric, building materials, and paper. In a study of the deterioration of book papers in libraries it was found that books stored in cities where atmospheric pollution as high as 1.2 parts of sulphur dioxide per 1,000,000 parts of air may be reached, were in a uniformly poorer state of preservation than similar books stored in rural or suburban localities where the air was relatively free of sulphur dioxide. To remove this acid-forming gas from the atmosphere, and to control the humidity so as to inhibit the growth of certain molds, it was natural to turn to air conditioning.

A series of tests run in the Folger Shakespeare Library, Washington, D. C., equipped with air conditioning equipment designed to circulate air at the proper temperature and relative humidity within the stacks and vaults, indicated that the sulphur dioxide was not completely removed from the air by washing it with untreated water in the conventional way. Effective elimination was secured, however, by washing the air with water to which an alkaline solution had been added.

These tests indicated that the alkaline material should be added to the water in the washer at such a rate that the hydrogen ion concentration of the washer water is maintained within the range of pH 8.5 to 9.0. The sulphur dioxide concentration of the washed air was found to be entirely dependent upon the hydrogen-ion concentration of the wash water.

NRA Organizes for Compliance—Contractors' Code Amended

CODE compliance is receiving more and more emphasis on the part of NRA. Now that the number of approved codes is in the neighborhood of 400, codification is well along toward completion.

During the past month a number of events occurred which showed a trend toward emphasizing compliance. In the first place, NRA itself was reorganized entirely. This involved a good deal of shifting of personnel, and it is evident that the general objective is to make it possible to secure better compliance with the approved codes. Then, too, the government won several victories in the courts which helped to clarify the law and permit a clear understanding of just how far the provisions of the codes are likely to be upheld and therefore made enforcible. No doubt these decisions have helped to strengthen the determination to go ahead with a program of compliance.

The Administration also issued to the compliance organizations new instructions which were intended to simplify administration and to get more cases into the courts. In other words, the government encouraged by the favorable court decisions, is now ready and anxious to get decisions on questionable cases instead of holding off and avoiding any legal battles.

Compliance also received added impetus with the President's order issued on March 14 which directed that thereafter all bidders and suppliers of material on government work must certify compliance with the codes to which they are subject. This was also construed as meaning that not only must the manufacturer himself certify compliance with his code, but that dealers and agents must a'so certify compliance. In view of the large amount of government work, this order should tend to stiffen the enforcement of the codes.

Then, too, a rule was set up, designed to make it possible to collect the cost of code administration. This had been one of the weak points ever since the work of the Code Authorities started. Up until this time there has been no way in which authorities could force the assessment of costs. The new order provides for approval of budgets of Code Authorities and was intended to make it possible for the Authorities to assess costs equitably, within the limits of the approved budget.

As a further aid to compliance an executive order has been issued, calling for the posting at prominent locations in his establishment, of the labor provisions of the Code under which the manufacturer is operating. Regulations called for the posting of an official placard which could be obtained on'y through the designated Authority. Application forms for securing these placards were necessary, and since posting was required on the part of each member of the industry, this was a means of being sure of collecting full lists of names. Curiously enough, actual enforcement of this provision has been postponed because of the inability of the Government to print official placards. It is expected that this movement will go along as soon as the placards are available.

Another line of recent activity within NRA has been the checking up of the early codes approved to learn in what respects they are out of line with more recent policies, and to get them amended in the interests of uniformity. In the case of the Boiler Manufacturing industry code, approved in October, omissions from the approved code have been remedied by a supplementary code, providing for a uniform cost accounting system and for open price lists.

It has been freely predicted that as compliance work gets further advanced pressure will be exerted from within NRA to get groups having similar interests to ally themselves together under a Master Code, and various supplementary codes. This is the general plan followed in the case of the Construction Industry and in the case of the Machinery and Allied Products industry, both of which have a master code with numerous supplementary codes. A proposal along this general line has already been made looking to the formation of a Heating, Ventilating and Air Conditioning Institute (see HEATING AND VENTILATING, January, 1934, page 30).

This still remains in the form of a suggestion and little progress has been made toward getting it into concrete or workable form.

Manufacturing Codes

Manufacturing codes actually approved recently are those for the Air Valve industry and the master code of the Machinery and Allied Products industry. Included supplementary groups in this latter industry are air filters and refrigerating machinery. The Code as approved on March 17 also makes provisions for the Heat Exchange industry and the Pump Manufacturing industry to join this group if they desire to do so.

The principal provisions of the Air Valve Industry Code (approved March 31) include a basic 40-hr. week and 40 cents per hour minimum labor rate, publicity of prices, terms, and conditions of sale with lists to be filed with the Code Authority. Changes in any of these items are effective upon filing with the Code Authorities. Sales must be made on the basis of a written quotation or bill of sale with price protection for 30 days under certain conditions and with quotations void after 60 days. The practice of accepting blanket orders is prohibited and all quotations on orders must specify an itemized bill of goods. Delayed billing is listed as an unfair practice and also the practice of furnishing heating plans and specifications to engineers, architects, and others, unless a charge approved by the Code Authority is made in connection with them. The list of trade practices is, in general, similar to that included in the majority of the manufacturing codes.

Another code of recent approval (April 4) is that of the Non-Ferrous Hot Water Tank manufacturers. This is administered as a division of the Fabricated Metal Products industry and covers tanks not exceeding 119-gal. capacity. Provisions for uniform cost accounting and prohibiting of selling under cost are included in the code. So also is separate invoicing, and invoices must be filed with the Code Authority if requested. Lump sum bidding is prohibited and, in addition, the code provides for means whereby the products of the industry may be standardized.

With the approval of these codes virtually all the manufacturing codes which include products used in heating and ventilating have now been approved.

Construction Codes

While the master code for the Construction industry has been in effect for some time now, progress has been slow in securing approval of the separate chapters. Those governing heating, piping, and air conditioning contractors, professional engineers, and architects have not yet been approved. Discussions, revisions, and corrections are still under way and there is no definite indication when approval will come.

In the case of the Contractors code, a new public hearing was called before the administration on April 12 in Washington. The purpose of this hearing was to receive a revised supplementary code to take the place of the one on which a public hearing was held several months ago.

The new proposed code which appears as Registry No. 1616-2-31A is obtainable from the Superintendent of Documents, price 5 cents. It is marked as a supplementary code revised for public hearing on April 12. It is virtually a new code so far as phraseology and arrangement are concerned. Most of the changes made in wording were to obtain clearness and more definite language rather than to make fundamental changes. Other changes were necessary in the proposed code to bring it in agreement with the Master Code.

One significant provision of the new code is very definitely a change from that of the former one. This is the part of the code which has to do with minimum wages paid to journeymen steamfitters. The original code filed last summer set up minimum wages for journeymen, helpers, and sheet-metal workers. The present code mentions journeymen and apprentices. The former code also had a differential scale, varying with the size of the city from $1 per hr. in cities over 500,000, to 60 cents per hour in cities under 100,000. The new code does away with this method and sets up a differential based on zones. The minimum wage in the Northern zone is $1.20 per hr.; in the Central zone is $1.10, and in the Southern zone is $1.00 per hr. In all zones apprentices are to receive not less than $12 per week. The wage provision also makes it clear that the new rates are not to be construed as superseding the provisions of valid labor agreements in force. Provision is also made for reconsidering the wage scales 90 days after the effective date of the code and periodically thereafter.

The section having to do with definitions is a'so considerably changed and clarified from the language of the original code. This article as it stands in the revised code is given herewith.

Section 1. (a) The term "Heating, Piping and Air Conditioning Contractors Division," or "this division," as used herein shall include the furnishing and installing of systems, or parts thereof, for steam and hot water heating, ventilating, refrigeration, air conditioning, power piping, industrial process piping, sprinkler piping, temperature control piping, high- and low-pressure boilers, stokers, oil-burning units, pneumatic piping, hydraulic power piping, and all apparatus, appurtenances, and piping systems in connection therewith, regardless of whether such piping conveys steam, water, air, brine, ammonia, oil, or other fluids or other commercial products, or products in course of manufacture; and

(b) pipe covering and painting when required by, and included in, the contract for any of the services or operations described in paragraph (a) of this section, and not performed under subcontract let by a member of this division; and

(c) sheet metal work when required by, and included in, the contract for any of the services or operations described in paragraph (a) of this section, and not performed under a subcontract let by a member of this division; and

(d) such branches or subdivisions of the services or operations included in paragraphs (a), (b), and (c) of this section as may from time to time be included under the provisions of this Chapter.

Section 2. The words "sprinkler piping" as used in this Article shall be construed as not including the installation of automatic sprinkler equipment for fire protection purposes; and all such installations are under the jurisdiction of the Automatic Sprinkler Code.

Section 3. Homeowners and householders, including farmers, shall not be deemed to be included within the definition contained in Section 1 in their performance individually or by their permanent servants or other help of like character on their home premises of any services described in such definition; nor shall any such person, or any building owner or tenant, performing such services by his permanent employees and not for hire or in buildings or structures owned or occupied by him, be deemed to be included in such definition.

The terms "permanent employees" and "permanent servants" as used in this section mean and include any employee or servant who is given regular and continuous employment for a period of not less than six (6) months.

Section 4. The term "combination bid" is herein defined as any bid including any work within this division, together with work not within this division.

Section 5. The term "Association" as used herein shall mean the Heating, Piping and Air Conditioning Contractors National Association.

Section 6. The term "journeymen steamfitters" is herein defined to mean any employee who has served at least five years as a learner in the steamfitting trade (either as an apprentice or helper).

Section 7. The term "apprentice" is herein defined as a learner of the steamfitting trade who is undergoing a definite course of training, which when completed will make him a "journeyman steamfitter."

Home Building Exemption

A disturbing factor in the situation surrounding the Construction code has arisen due to the fact that the National Association of Real Estate Boards has questioned the jurisdiction of the Construction industry over the Land Development and Home Building business. Real estate interests contend that developing land and building houses on it is, and always has been, properly under their control. As a result of this situation, the National Association of Real Estate Boards has been instructed to file a code for this industry, namely, the Land Development and Home Building industry. Preliminary drafts have been filed but the wording of the draft has not reached NRA as we go to press. It appears certain, however, that the minimum wage and maximum hour rates will be the same as for the master code of the Construction Industry—that is, 40 cents per hour minimum and a 40-hr. week. It is reported that NRA has insisted that the National Association of Real Estate Boards—Home Building Division—supply the administration with data showing the volume of building done by them, and with evidence establishing its jurisdiction. On March 21, General Johnson signed a stay order, exempting the Land Development and Home Building industry from the provisions of the Construction Code.

This leaves the situation standing at present as follows: Under General Johnson's stay order the Construction Code is now inoperative in the Land Development and Home Building field. The National Association of Real Estate Boards has submitted a code of its own covering this industry. Whether the stay order will be made permanent or not remains to be seen. Washington observers predict that it will be made permanent only over strenuous objections on the part of the Construction Industry which feels that it should have jurisdiction over this work.

Engineering Code Revised

The original code filed with NRA last summer covering engineering services in the construction industry has undergone repeated revisions. With each revision the definition of what engineering services are to include is reworded and rephrased and the complexity of the engineering work has made it troublesome to get suitable outlines covering the methods of practice. There has a'so been a good deal of discussion and questioning as to jurisdiction. The result has been revision after revision to attempt to get a suitable code drawn up which will cover the facts, and be fair and workable.

The latest revision available divides engineering services into two groups along the lines of methods of practice. The first group is made up of those who practice professional engineering, and the second group is made up of those who are engineers and contractors combined. The professional engineer group includes those who provide professional services but do not undertake responsibility for construction performance. The second group may offer engineering services and at the same time take on responsibility for construction.

It can be seen that where such a division as this is made in a single code it is difficu't to lay down suitable rules.

The present revision calls for a divisional code authority of 11 members, selected by three of the existing technical societies. While there is no means of getting any authoritative statements on the subject it is quite probable that this code will have to undergo further revisions before it is accepted. This prompts the suggestion that final approval of the code for this group is still some distance off.

LOWEST RECORDED TEMPERATURES IN 108 CITIES

The very severe cold wave in February, 1934, set new low records in a few cities in the east. Lowest recorded temperatures in 96 cities, published in the July, 1933, issue on Reference Data sheets 13 and 14, were those up to about 1922, and in order to bring this information up to date, including the 1934 lows, these pages have been prepared as supplementary to and, in a few cases, partly superseding Reference Data 13 and 14.

The asterisk in the fifth column indicates that the winter of 1933-34 broke or equalled previous low records.

Design temperatures are not repeated here. For these see data sheets 13 and 14.

State	City	Low Temp., 1933-34, °F.	Date of 1933-34 Low	Record Low (*Indicates this record broken 1933-34)	Date of Record Low	Wind Velocity (m.p.h.) and Direction at Time of 1933-34 Low
ALABAMA	Birmingham	10	Jan. 30	−10	Feb. 13, 1899	7 N.
	Mobile	24	Jan. 30	−1	Feb. 13, 1899	—
	Montgomery	18	Jan. 30	−5	Feb. 13, 1899	N.
ARIZONA	Phoenix	29	Dec. 13	16	Jan. 17, 1913	3 E.
	Tucson	21	Jan. 7	6	Jan., 1913	4 to 5
ARKANSAS	Ft. Smith	15	Feb. 27	−15	Feb. 13, 1899	12 E.
	Little Rock	14	Jan. 30	−12	Feb. 13, 1899	—
CALIFORNIA	Los Angeles	40	Dec. 25	28	Jan. 7, 1913 Feb. 6, 1888	4 N.W.
	Sacramento	33	Dec. 16	17	Dec. 11, 1932	5 N.E.
	San Diego	42	Jan. 15	25	Jan. 7, 1913	3
	San Francisco	39	Dec. 25-26	27	Dec. 11, 1932	11 to 17 N.
COLORADO	Denver	4	Feb. 25	−29	Jan. 9, 1875	3
CONNECTICUT	Hartford	−15	Feb. 9	−18	Dec. 30, 1917	7 N.W.
	New Haven	−15	Feb. 9	*	—	12 N.
DIS. OF COLUMBIA	Washington	−7	Feb. 9	−15	Feb. 11, 1899	9 N.
FLORIDA	Jacksonville	28	Jan. 30	10	Feb. 13, 1899	13
	Miami	45	Feb. 3	27	Feb. 3, 1917	9
	Pensacola	25	Jan. 30	7	Feb. 13, 1899	18 N.E.
	Tampa	34	Jan. 30	19	Dec. 29, 1894	11
GEORGIA	Atlanta	7	Jan. 30	−8	Feb. 13, 1899	17 N.W.
	Macon	14	Jan. 30	7	Jan. 6, 1924	10 N.W.
	Savannah	22	Feb. 10	8	Feb. 13, 1899	12 N.E.
IDAHO	Boise	20	Dec. 16	−28	Jan. 16, 1888	2 N.
ILLINOIS	Chicago	−9	Dec. 27	−23	Dec. 24, 1872	7 to 9 W.
	Peoria	−9	Feb. 27	−24	Dec. 28, 1924	2 to 3
	Springfield†	−3	Feb. 27	−24	Feb. 13, 1905	(Light) W.
INDIANA	Evansville	−1	Feb. 27	−16	Jan. 12, 1918	4 N.
	Ft. Wayne	−10	Feb. 9	−24	Jan. 12, 1918	9 to 11 N.E.
	Indianapolis	−7	Feb. 9	−25	Jan. 5, 1884	E. and N.E.
	Terre Haute	−3	Feb. 27	−18	Jan. 7, 1912 Jan. 12, 1918	4
IOWA	Davenport	−11	Dec. 26-27	−27	Jan. 5, 1884	6 W.
	Des Moines	−10	Feb. 27	−30	Jan. 5, 1884	6 S.E.
	Dubuque	−18	Dec. 27	−32	Jan. 7, 1887	4 E.
	Sioux City	−15	Dec. 26	−35	Jan. 12, 1912	12 N.W.
KANSAS	Concordia	−8	Feb. 26	−25	Jan. 15, 1888	8 W.
	Dodge City	2	Feb. 26	−26	Feb. 13, 1899	8
	Topeka	−8	Feb. 27	−25	Feb. 12, 1899	6 E.
LOUISIANA	New Orleans	29	Jan. 30	7	Feb. 13, 1899	13 N.E.
MAINE	Eastport	−23	Dec. 30	*	—	18 N.W.
	Portland	−18	Dec. 29 Feb. 9	−21	Dec. 30, 1917	21 N.
MARYLAND	Baltimore	−7	Feb. 9	*	—	21 N.E.
MASSACHUSETTS	Boston	−18‡	Feb. 9	−14*	Dec. 30, 1917	21 N.W.
	Nantucket	−4	Feb. 9	−6	Feb. 5, 1918	17 N.W.
MICHIGAN	Detroit	−16	Feb. 9	−24	Dec. 22, 1872	5 N.E.
	Grand Rapids	−16	Feb. 9	−16*	Feb. 10, 1912	9 to 11
	Lansing	−18	Feb. 9	−26	Jan. 6, 1887	6 N.E.
MINNESOTA	Duluth	−32	Dec. 25	−41	Jan. 2, 1885	11 W.
	Minneapolis	−19	Dec. 28	−31	Jan. 24, 1904	13 N.
MISSOURI	Kansas City	−13	Feb. 27	−22	Feb. 12, 1899	8
	St. Louis	3	Feb. 27	−22	Jan. 5, 1884	5 W.
MONTANA	Helena	−8	Feb. 26	−42	Jan. 31, 1893	2

†*Much colder temperatures prevailed in Jacksonville, Ill., and Lincoln, Ill., this date— −28° and −25°, respectively.*

‡*Record broken twice in 1933-34 winter. On Dec. 29, 1933 a low of −17 was reached with a wind of 24 N.W.*

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LOWEST RECORDED TEMPERATURES IN 108 CITIES

State	City	Low Temp., 1933-34, °F.	Date of 1933-34 Low	Record Low (°Indicates this record broken 1933-34)	Date of Record Low	Wind Velocity (m.p.h.) and Direction at Time of 1933-34 Low
NEBRASKA	Lincoln	−9	Feb. 26	−29	Jan. 19, 1892	7
	Omaha	−7	Feb. 26	−32	Jan. 5, 1884	10 N.W.
NEVADA	Reno	9	Dec. 17	−19	Jan. 8, 1890	3
NEW HAMPSHIRE	Concord	−21	Dec. 28-29-30	−35	Jan. 8, 1878	—
NEW JERSEY	Atlantic City	−9	Feb. 9	•	—	24 N.W.
	Trenton	−14	Feb. 9	−13°	Jan. 30, 1873	13 N.
NEW MEXICO	Albuquerque	9	Jan. 8	−10	Feb. 15, 1895	5 N.
	Santa Fé	6	Jan. 8	−13	January, 1888 Dec., 1879	8 N.E.
NEW YORK	Albany	−21	Dec. 30	−24	Jan. 5, 1904	5 N.
	Binghamton	−26	Feb. 9	−28	Jan. 17, 1893	4 N.
	Buffalo	−21	Feb. 9	•	—	10 S.
	Ithaca	−24	Feb. 9	•	—	3 N.E.
	New York	−14	Feb. 9	•	—	15 N.
	Rochester	−22	Feb. 9	•	—	3
	Syracuse	−24†	Feb. 9	−22°	Jan. 13, 1914	5 S.
NORTH CAROLINA	Charlotte	8	Feb. 10	−5	Dec. 30, 1880	12 N.W.
	Greensboro	4	Jan. 30	−2	Feb., 1899	8 N.W.
	Raleigh	8	Feb. 10	−2	Feb. 14, 1899	13 N.
NORTH DAKOTA	Bismarck	−23	Dec. 25 Dec. 27	−45	Jan. 19, 1916	2
OHIO	Cincinnati	−7	Feb. 9	−17	Feb. 9, 1899	14 N.E.
	Cleveland	−11	Feb. 9	−17	Jan. 29, 1873	9 N.E.
	Columbus	−8	Feb. 9	−20	Jan. 3, 1879 Jan. 6, 1884 Feb. 10, 1889	13 N.E.
	Dayton	−7	Feb. 9	−28	Feb. 13, 1899	—
	Toledo	−13	Feb. 9	−16	Jan. 25, 1897	14 E.
OKLAHOMA	Oklahoma City	11	Feb. 26	−17	Feb. 12, 1899	15 N.
	Tulsa	11	Feb. 26	−16	Jan. 22, 1930	15 N.
OREGON	Portland	33	Feb. 14	−2	Jan. 15, 1888	5 N.W.
PENNSYLVANIA	Erie	−13	Feb. 9	−16	Feb. 9, 1875	13 N.E.
	Harrisburg	−11	Feb. 9	−14	Jan. 14, 1912	9 N.
	Philadelphia	−11	Feb. 9	−10°	Jan., 1866	24 N.
	Pittsburgh	−11	Feb. 9	−20	Feb. 10, 1899	10 to 12
	Reading	−11	Feb. 9	−14	Jan. 14, 1912	16 N.
	Scranton	−19	Feb. 9	−19‡	—	9 N.
RHODE ISLAND	Providence	−17	Feb. 9	•	—	15 N.W.
SOUTH CAROLINA	Charleston	18	Jan. 30	7	Feb. 14, 1899	24 N.
	Columbia	14	Jan. 30	−2	Feb. 14, 1899	4
SOUTH DAKOTA	Aberdeen	−23	Dec. 16	−46	Jan. 12, 1912	—
TENNESSEE	Chattanooga	8	Jan. 30	−10	Feb. 13, 1899	7 N.
	Knoxville	5	Jan. 30	−16	Jan. 6, 1884	9 N.W.
	Memphis	11	Jan. 30	−9	Feb. 12, 1899	8
	Nashville	5	Jan. 30 Feb. 27	−13	Feb. 13, 1899	9 N.
TEXAS	Dallas	20	Feb. 26	−8	Jan. 18, 1930§	22 N.
	El Paso	19	Jan. 8	−5	Dec. 31, 1880	6 N.W.
	Ft. Worth	21	Feb. 26	−8	Feb. 12, 1899	—
	Galveston	34	Feb. 26	8	Feb. 13, 1899	15 N.
	Houston	29	Feb. 26	−5	Jan. 18, 1930	14
VERMONT	Burlington	−30	Dec. 30	•	—	6 E.
VIRGINIA	Norfolk	6	Feb. 9	2	Feb. 8, 1895	30 N.
	Richmond	−1	Feb. 9	−8	Feb. 10, 1899	15 N.E.
WASHINGTON	Seattle	22	Jan. 8	3	Jan. 31, 1893	5 S.E.
	Spokane	20	Dec. 16	−30	Jan. 16, 1888	9 S.
	Walla Walla	22	Dec. 26	−29	Jan., 1875	4
WISCONSIN	La Crosse	−22	Dec. 27	−43	Dec. 18, 1872	7 S.
	Madison	−17	Dec. 27	−39	Jan. 21, 1888	3 W.
	Milwaukee	−11	Dec. 27	−25	Jan. 9, 1875	12
WYOMING	Cheyenne	−9	Feb. 26	−38	Jan. 9, 1875	2
	Sheridan	−23	Feb. 26	−41	Dec. 9, 1919	1

†*Actually* −24.4. *The record was broken twice in the same winter, previously having been broken on Dec.* 29, 1933 *by a temperature of* −23.7.

‡*All time low equalled in* 1933-34.

§*Wind velocity at time of record low was* 7 *W.*

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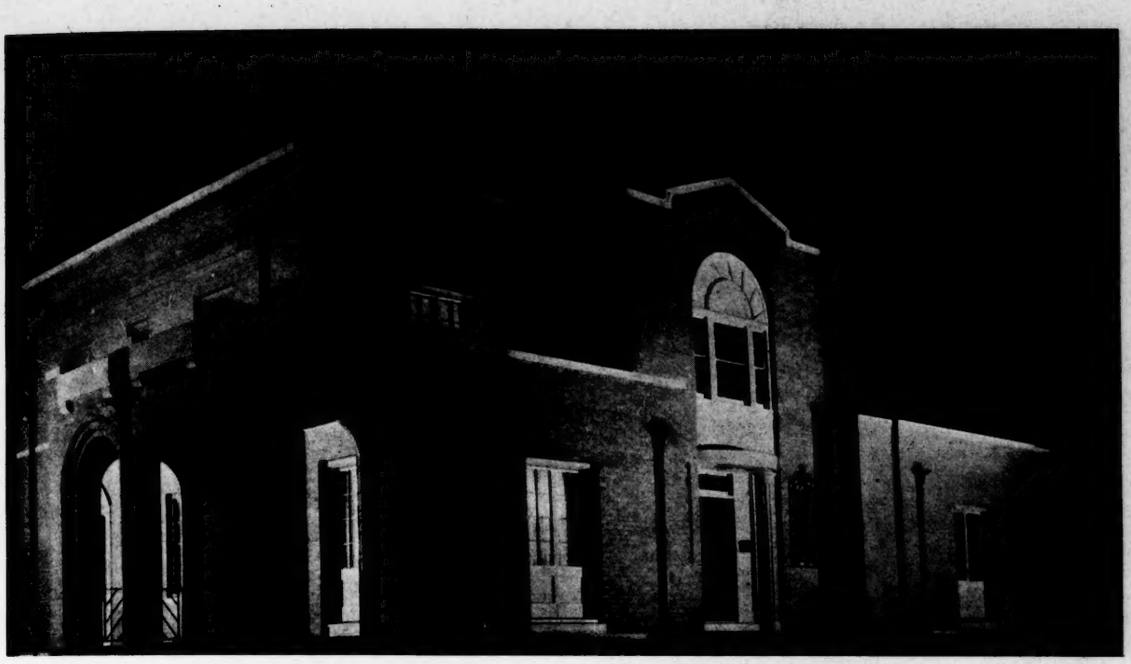


Fig. 1. The "Home of Tomorrow" in Mansfield, Ohio

Selective Cooling for Residences

By J. F. LAMB†

RAPIDLY increasing interest in air conditioning calls attention to some of the engineering and economic problems to be solved before air conditioning, including cooling with refrigeration, is applied to the home on a large scale.

In order to completely cool an entire residence, refrigeration equipment with a heat removal capacity at rates between 45,000 and 80,000 B.t.u. per hr. is required. For driving the mechanical compressors for such installations, motors ranging from 5 hp. to 11 hp. in size are required. The first cost of the equipment is large, being of the order of $1500 or $2000. There are also other problems including power service for handling a 6 or 7½-hp. motor, noise, and light flicker and voltage regulation.

Selective cooling means the installation of refrigerating equipment of limited cooling capacity in combination with a means for transferring the cooling power from one portion of the residence to another portion at will. Very little work has been done commercially as yet in the way of applying the idea of selective cooling to residences which are air conditioned.

There are a number of ways in which selective cooling can be installed in a residence. A selective cooling installation, using a central duct system, has actually been installed in a house known as the "Home of Tomorrow" at Mansfield, Ohio (Fig. 1).

This house is an eight-room brick veneer house of approximately 24,000 cu. ft. capacity. It was built primarily to demonstrate the possibilities in the application of electricity to the home, so that the lighting load and other load are high. This residence was constructed in the fall of 1933, and the air conditioning system is complete, except for the addition of a standard mechanical condensing unit which will be made in the spring of 1934.

The calculated cooling load for the entire house is 53,000 B.t.u. per hr. This is rather low for a house of this size, and is due to the fact that the house is well constructed, well heat-insulated, and is equipped with double window panes.

Fig. 4 shows the arrangement of the air conditioning unit, the duct system, and the damper arrangement for obtaining selective cooling of the house. The air conditioning unit, consisting of a blower, a filter, heating coils, and cooling coils, is located in the "weather room" in the basement.

The duct system is split into three sections. One section consists of supply and return ducts to the three bedrooms. Another section consists of supply and return ducts to the living room and dining room. The third section consists of supply and return ducts to the rest of the rooms in the house. Six electrically-operated shut-off dampers are used to shut off the supply and return duct sections in response to requirements of the control. With this arrangement, air can be supplied to the entire house, or to the three bedrooms alone, or to the living room and dining room alone, by proper operation of the electric damper.

Fig. 5 shows a view of the weather room with the air conditioning unit and the ductwork. The selector switch in the basement, a close-up view of which is shown in

†Air Conditioning Engineer, Westinghouse Electric & Manufacturing Company.

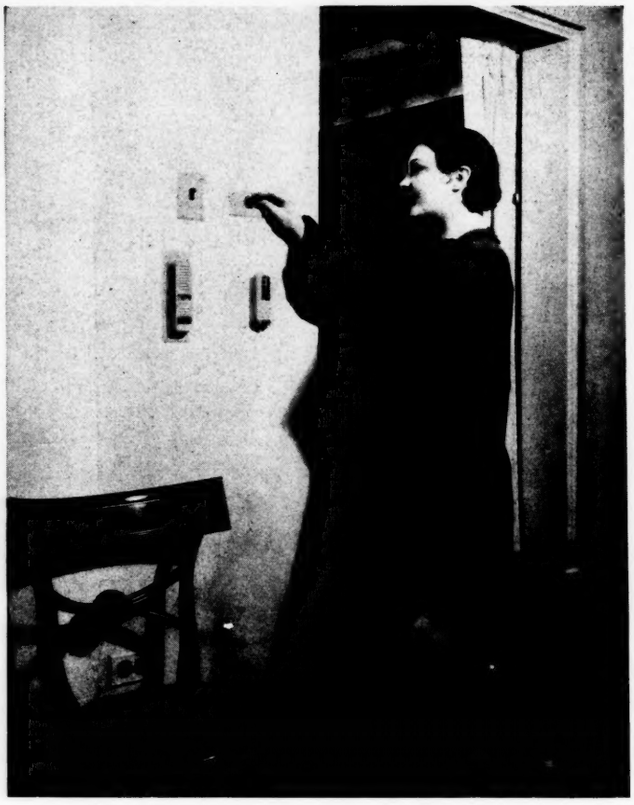


Fig. 2. (Left) Adjusting the cooler selector switch in the hall. Fig. 3. (Above) The cooling control showing the various positions for summer and winter conditioning.

Fig. 3, and which is mounted on the side of the main controller in the "weather room," is used to determine whether the equipment is to furnish heating, complete cooling of the living room and dining room or the three bedrooms as desired, or partial cooling of the entire house.

From the user's standpoint, the cooling control is easy to operate. Let us suppose that the basement control switch (Fig. 3) is turned to the center position marked "summer cooling, living room or bedroom." With the basement selector switch in this position, it is possible to completely cool (supply 15° cooling) the living room and dining room, or else the three bedrooms.

Which of the two locations is to be cooled is determined by the selector switch in the hall which the woman is shown adjusting in Fig. 2. This hall selector switch has two positions, one for the living room and the other for the bedrooms.

Let us assume that this hall selector switch has been turned to the bedroom position. All of the electrically-operated dampers shown in Fig. 4 are then closed with the exception of supply and return dampers "A" to the bedrooms, so that the blower will supply air only to the three bedrooms. Control of the blower motor and the condensing equipment is then possible from a bedroom control switch station. This control station consists of one switch which, when closed, causes the blower

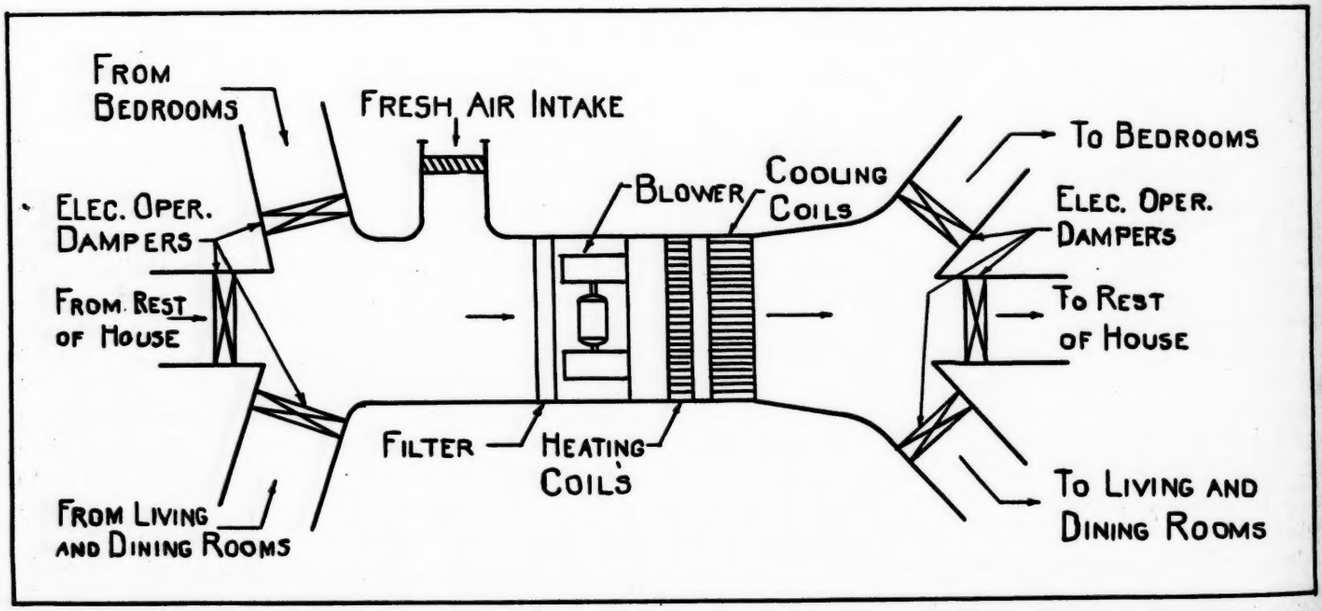


Fig. 4. Arrangement of the air conditioning unit duct system and electrically-operated dampers for selective cooling.

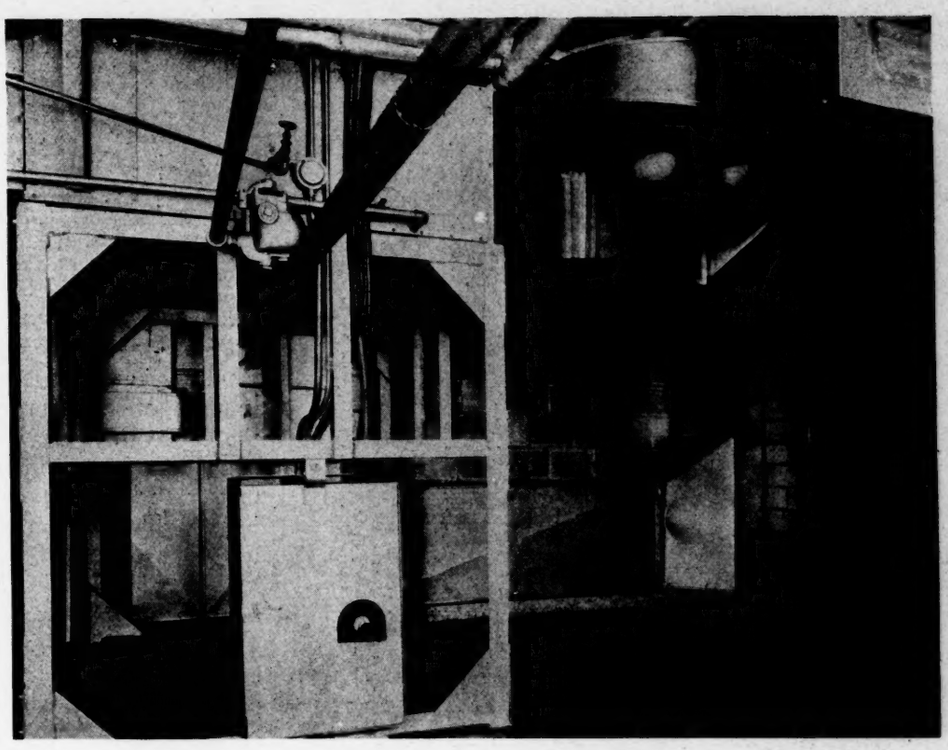


Fig. 5. The "weather room" showing the air conditioning unit, ductwork, and main controller.

to run continuously and the compressor motor to start and stop under control of the bedroom thermostat. Thus, cooling of the three bedrooms is accomplished. If it is desired to obtain only air circulation without cooling, this can easily be done by opening the cooling switch and closing another switch which will cause the fan to run continuously without the refrigerating equipment. In case it is desired to cool the living room and dining room instead of the three bedrooms, the hall selector switch, Fig. 2, is thrown to the living room position, and the control of the blower motor and refrigerating equipment is then transferred to a control station in the living room similar to the bedroom control station. The electrically-operated dampers operate to shut off the supply and return ducts to the entire house except the living room and dining room.

In this manner, the whole cooling effect of the limited capacity of the refrigerating equipment can be transferred at will. The refrigerating equipment actually to be installed is 24,000 B.t.u. per hr. capacity as against 53,000 B.t.u. per hr. capacity required for cooling the entire house.

The control is so arranged that it is possible to cool the entire house as much as the limited capacity of the refrigerating equipment will permit. This can be done by turning the basement control switch to the position marked "summer cooling, entire house." If this is done, all of the electrically-operated dampers will open so that the air conditioning unit blower will force air throughout the entire house. The blower motor control is so arranged that the fan will operate at a higher speed, forcing more air through the unit in this position than it does when cooling only part of the house. When cooling the entire house in this manner, the refrigerating equipment and blower can be controlled either from the living room control station or from the bedroom control station as before, depending upon the position of the selector switch in the hall.

Physiological Effects of Radiant Heat

PUBLISHED statements by Sir Leonard Hill reporting his findings in the matter of exposure of the skin to luminous and non-luminous sources of radiant heat have occasioned considerable controversy in British scientific circles. In a paper read to the Institution of Heating and Ventilating Engineers, A. F. Dufton controverts Sir Leonard's hypotheses and describes a series of investigations into the subject made by himself and a collaborator, Doctor Bedford of the Industrial Health Research Board.

Sir Leonard Hill contended that a physiological antagonism occurs in the infra-red region, all dark sources of radiant heat causing the nose to constrict and resulting in a feeling of stuffiness, while bright sources of heat such as lamps, coal fires, and gas fires are "nose openers." He also stated that this nasal congestion is relieved by the action of a cooling agent only when applied to the same part of the skin as that exposed to the dull source of radiant heat.

The new experimental work, conducted in the air-conditioned room at the London School of Hygiene and Tropical Medicine, was carried out with the subjects blindfolded and shielded from the lights of the room and from drafts. It is reported that with none of the 85 subjects was evidence found of any change in the inspiratory pressure due to change in the source of radiation. The nose-closing effect was found to occur with radiation from both bright and dull sources. The congestion of the nose was further found to be relieved by sponging the hand, and the nose closing was produced by heating the air of the room rapidly, or by warming the subject by a warm fomentation. It was concluded that this effect is the result of any rapid warming of the skin.

Abstracts . . .

Reviews and Summaries of. . . . Current Papers, Books and Pamphlets

Hospitals and Air Conditioning

Dr. C. A. Mills, professor of experimental medicine, University of Cincinnati, recently prepared one of the most thought-provoking papers on the relationship between climate and disease that has appeared so far. The same author has written a brief article on the desirability of hospitals providing air conditioning for the treatment of such ailments as arteriosclerosis, diabetes, and goiter.

[*"Hospitals Can Do Something About the Weather," by C. A. Mills, M.D., in the April,* 1934, *"The Modern Hospital"; 1½ pages; no illustrations.*]

●

The Cause of Cold 70

In order to determine the cause of Cold 70, the author of this article conducted tests on seven different types of houses. Because of the small number of houses tested, the results secured are not conclusive. The tests seemed to indicate, however, that the condition was not caused by either the type or method of operation of the heating system. It appears that the type of wall construction is the main cause. Thorough insulation of walls, proper weather-stripping of windows, and the installation of storm doors and windows will greatly reduce the temperature differential in the rooms.

[*"The Cause of Cold 70," by Prof. R. B. Leckie, "Gas Age-Record," New York, April* 7, 1934; *approximately* 2000 *words; nine graphs; three tables.*]

●

Pioneering in Psychrometry

Some 30 years ago, a British agent stationed at Shanghai undertook on his own initiative an elaborate study of climatology as it affects life, health, and comfort. These studies, continued at intervals over a period of 15 years, were entirely independent of other scientific investigations being carried on contemporaneously, and present some interesting conclusions, arising as they do from independent and original observations.

Having recognized that similar physical reactions occurred in humans at temperatures that might be as much as 15° apart, the author, surmising a relationship between degree of discomfort and the wet-bulb temperature, set about investigating how best an indoor climate could be produced to give comfort in the summer as a heating system does in winter. The selection of a scale for designating the sensation of comfort presented some difficulty, but it was decided to establish a climatic scale of 10° called "Hythers," zero to represent the conditions prevailing when the observer, suitably clad and free from exertion, felt no discomfort from heat and moisture, and the other limit to represent the worst condition experienced or imagined by the observer. Twelve observers were secured who, at noon each day, sitting quietly in their offices, gave the matter their serious consideration and recorded their feelings by means of the hyther scale, interpolating where possible.

From the data thus provided, plots were made with temperature and wet-bulb depression as coordinates. The matter of air movement was neglected for the time being, as each observer was provided with the amount of draft either by fan or natural breeze that best suited him. Fig. 1 shows how the zones of constant hyther degrees fell after the data had been averaged and weighted, with irregularities smoothed out.

The question then arose as to what would be the effect of drying the air when the temperature was 100° with a wet-bulb difference of 7°, representing hyther 8, until the wet-bulb difference equalled 12, falling within hyther 6. Would hyther 0 be achieved if the process were continued? This could not be answered from Fig. 1, but it was obvious, nevertheless, that there must be a limit to the temperature that could coexist with hyther 0, indicating that the zone boundaries must, when extended, curve to the left. This eventually led to the author's conclusion that, for Shanghai, where the normal maximum temperature was 100°, this being approximately the coexistence temperature, a mere air-drying process would serve all the needs of comfort. An experimental air-drying installation was installed in the Shanghai General Hospital, ice being used to precipitate the moisture out of the air, which was then raised to the original temperature by radiation and convection from the walls. Provision was made for thus conditioning the air in the operating room, and this met with favorable acceptance.

Further investigations of the writer were concerned with the extension of the hyther lines into the regions of low humidity, and it was ultimately concluded that the terminal slopes of the boundary lines gradually in-

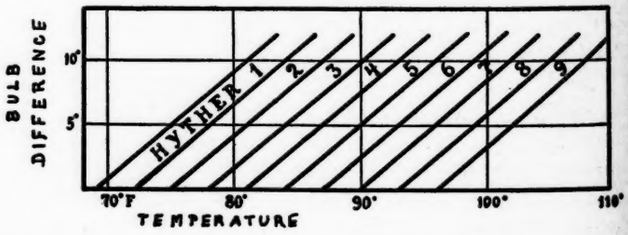


Fig. 1.

crease in steepness, approaching verticality. The paper then goes into the matter of the relative *bracingness* and *relaxingness* of certain climates, which he attributes largely to the relative humidity and in part to other more complex influences of climate.

Next to be considered is the matter of "rawness," as experienced in cold and damp climates. This the author ascribes to the lessened effect of evaporation through heavier clothes, and the conductivity of damp air. The effects of wind are discussed, the author setting forth conclusions not very different from those generally accepted. That the author is cognizant of other and more complex climatological influences is evidenced by his observations — unexplainable by means of available climatological data — of periods when the population of Shanghai collectively exhibited extreme lethargy or extreme activity and excitability. In an appendix, the author compares the results of his work with those of the American investigators, Messrs. Houghten and Yaglou.

[*"Some Psycho-Physics of Climate," by W. F. Tyler, F. R. Met. Soc., London. A paper read at the Eastbourne Congress; 26 pages; approximately 7000 words; bibliography; charts.*]

●

Principles of Heating and Ventilation— An English Textbook

Most American textbooks published on heating and ventilation have been more or less closely allied with the practices in the art. H. M. Vernon, an English writer, has recently prepared a comprehensive discussion of the principles of heating and ventilation, and since Doctor Vernon has not confined his attention to practice, his book is more applicable to American uses than it would otherwise have been. Much of the material in the book has been available heretofore only in widely scattered publications and reports, and the book can be recommended from the standpoint of compactness even if this were its only merit, which it is not.

The material on measurement of environmental conditions by means of thermometers, kata-thermometers, eupatheoscopes, and such instruments, is quite up to date. The chapter on "Heating by Means of Open Fires," while it seems rather unnecessary to American readers, is at least valuable inasmuch as it includes data with which engineers in this country are not ordinarily familiar.

Possibly the most interesting features to many are the chapters on low-temperature radiant heating, using both hot water and electricity, and the discussions the author has presented about it. So much has been published in this country regarding the advantages of radiant heating that an unbiased presentation of the facts, including those dealing with the disadvantages of such systems, was badly needed. Regarding the low temperature panel system of radiant heating the author points out that—"The feebleness of the direct warm-effect of a low-temperature panel system is a point on which emphasis must be laid, as claims have been put forward for the system which cannot be substantiated. It is said that the direct warming effect of the panel radiation is so considerable that reasonable ventilation be maintained without serious loss of heat, and that on a still, cold day the occupants of a room are able to sit comfortably in it with the windows open. If, as we have already seen, the air temperature keeps within 3° of the surface temperature of the walls and furniture, it follows that removal of this warm air by ventilation, and its replacement by cold air from outside, induces a heat loss only slightly less than that induced by a corresponding degree of ventilation in rooms heated by hot-water radiators, provided that there is not much of a temperature gradient in the air. If, on the other hand, the air at ceiling-level is 20° warmer than at breathing-level, and this overheated air is removed by ventilation, it naturally leads to a greatly increased heat loss.

"The panel system has so many well-established advantages that it does not need the support of adventitious claims which cannot be supported."

In addition, Doctor Vernon questions the economy claimed for the panel system as follows:

"It is claimed that the panel system is considerably more economical than hot-water radiator systems. A. H. Barker states that, to produce an equal heating effect, the amount of heating surface required is between half and two-thirds that of ordinary hot-water radiators, and that the necessary consumption of fuel is reduced in like proportion. Again, it is stated that though a panel scheme costs 20 to 25% more to install than a radiator scheme, the saving of fuel is very substantial. Two fairly large installations are referred to in which the saving was 32 to 44%.

"Opposed to these claims is the evidence of a careful experiment made at the Watford Building Research Station, where a room warmed by electrically-heated ceiling panels was found to require 14% more heat input to maintain a given air temperature than the convected air system it replaced."

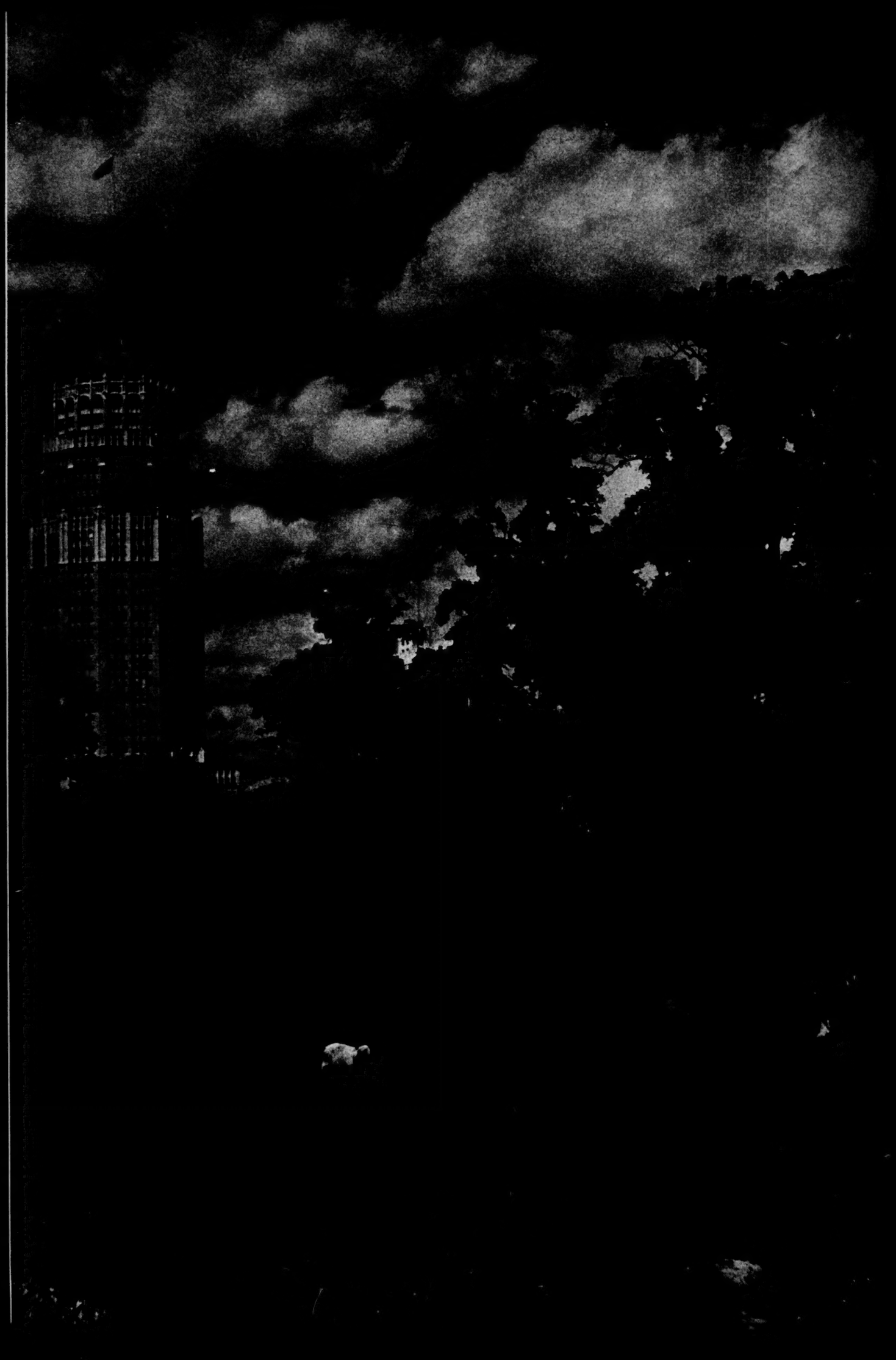
It is interesting to note that opinion in Great Britain is divided, as in this country, over the question of continuous vs. discontinuous heating, some tests showing that a saving can be effected by discontinuous heating while other tests show just the opposite.

In the chapters on natural and mechanical ventilation the author has carefully selected his material and brought the available data up-to-date. His chapters on humidity and air conditioning in industry are necessarily quite brief and probably not applicable to practice in this country.

The book is to be highly recommended since the author has brought the viewpoint of a doctor of medicine to a subject usually discussed only by engineers. Fortunately, there is evidence that the medical profession in our country, too, is taking more and more interest in our indoor air conditions.

[*"The Principles of Heating and Ventilation," by Doctor H. M. Vernon; cloth-bound; 6 in. × 9¼ in.; 232 pages; 52 illustrations; price $5. Obtainable from Longmans-Green & Co., 55 Fifth Ave., New York, or from* HEATING AND VENTILATING.]

(Abstracts continued on page 78)



EDITORIALS

Code Delays

ALL the NRA codes attached to the master code of the construction industry have been hard to phrase and difficult to define. Part of this trouble comes from the fact that the construction industry has never been integrated and there is confusion of ideas. The master code was itself delayed for months and relatively few of the sub-group codes are approved. Some of these are especially hard to put together. Examples of this are the two professional groups—the engineers and architects. Codes for both of these groups have been repeatedly drawn and redrawn. There is no indication that in their latest revised forms they are going to be approved. So also have the contractors' codes been long in waiting and subject to discussion and revision. The principal hope now lies not so much in early action as in the thought that all the effort being put forth ought to make for a better understood and better operating construction industry when the knots finally are untangled. The job is by no means hopeless—just difficult—and we still thoroughly believe that in the long run it will be well worth the trouble and delay.

The view on the opposite page shows one of the Southwest's outstanding buildings—San Antonio's Smith-Young Tower office building. The gas-fired heating system was designed by William Johns. Photograph by Galloway

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Government Help for Building

EVER since coming into office the Roosevelt administration has labored with the problem of how to do something to stimulate and pep up the lagging capital goods industries, including building. Plan has followed plan, proposals have been discussed and postponed or discarded; surveys and studies have been undertaken, and the results used or pigeon-holed. No one can honestly say that the importance of the problem has been underestimated, or that there has been any lack of earnest consideration given to it. What can be stated is that all the study and thought has not resulted in any major workable plan.

This failure cannot be wholly charged against the administration, for after all there was no way of predicting that NRA would produce its best results in the consumer goods industries, or that PWA projects would require so long a time to get started. Then, too, it must be kept in mind that the problem is one of exceeding complexity and that it was especially troublesome because it was tied up around distressed mortgages, closed banks, and a public reaction against many of the building financing practices of the boom years.

There is still no evidence that the administration is prepared to throw its full weight on the side of any of the measures pending in Congress. Rumors persist that this and that feature of certain bills are frowned on while others are looked on with favor. The Walker plan, which proposes private construction with government insurance of a percentage of standard mortgages and with a publicity campaign to arouse interest in modernizing, is perhaps the nearest approach to an administration plan which has come forth. It is doubtful if the whole plan can pass. Certainly, it cannot without full support. Some features, such as the publicity campaign, are expected to meet with little opposition. There is hesitation on the part of the administration to commit itself. This is another way of saying that no fully satisfactory plan is yet prepared.

While the party in power is hesitating the Committee on the Durable Goods Industries urges that if the securities law was amended and the exchange regulation bills were modified there would be such a rush of private capital into the durable goods industries that the problem of unemployment would be solved. This proposal attacks the problem from an entirely different angle than do those of any of the administration plans which have been announced. It would seem that this adds to the confusion and makes a quick decision less likely, if anything.

On the whole and in the light of all facts available it seems extremely unlikely that the building industry will see any comprehensive plan forthcoming from Washington this spring or summer. Help we may get in the form of more credit, or a campaign for modernizing, but probably not a well-rounded plan. We will have to look to ourselves for anything beyond this.

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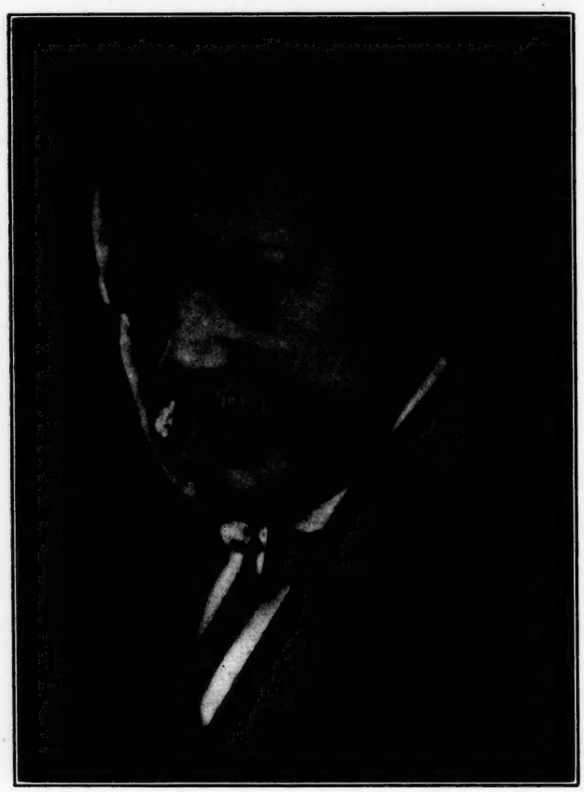
Home Building and the Construction Code

REAL estate interests have advanced their claim of control over land development and home building. If it can be shown that they really control this there is no doubt of the reasonableness of their proposal that they draw up a code for it. Pending determination, this kind of construction has been exempted from the provisions of the Construction Code. There has been some tendency to look at this development as weakening the Construction Code. It seems to us that whether it does so or not depends entirely on the kind of fair practice section included in the new code. If it prevents chiseling and bid-peddling where contracts are let, all that the new proposal does is to change the control, not the practices.

Dean F. Paul Anderson

F. Paul Anderson, Dean of the College of Engineering, University of Kentucky, died April 8 at his home in Lexington, Ky., after several months illness, at the age of 67.

In the passing of Dean Anderson, engineering has lost one of its most colorful figures. He had a larger share than most men ever hope to have in bringing to pass the things he thought would be, for he lived to see a small workshop become a College of Engineering and witnessed many developments in science that added much to life's comfort and pleasure.



Affectionately known among engineers and former students as "Little Paul" and the "Little Dean," his vision and outlook have been transmitted to a legion of his boys and to many national figures in engineering and industry.

Dean Anderson had a genius for companionship and friendship which evidenced itself in a generosity with his time, not measured by any possible return except from the pleasure of enriching lives of others with his own magnetic personality and inspiring them with his outlook, his knowledge, and his ability to lay cares aside and to enjoy life. Companionship was one of his hobbies, and his friendships among leaders of engineering, first as a means of stimulating his own unique processes for training men, and second for the purpose of giving him many fields of industrial activity in which to direct the steps of the boys who graduated from the College of Engineering, were developed largely in the weekly engineering assemblies which brought many notable engineers and scientists to Lexington.

Dean Anderson was born at South Bend, Ind., February 10, 1867, was graduated from Purdue University in 1890, and received his M.E. Degree from that University in 1894. In 1891, he became Professor of Mechanical Engineering and Dean of the School of Mechanical Engineering at the University of Kentucky. Since 1917 he was Dean of the College of Engineering. He built up the Engineering College at the University of Kentucky so that it took its place with the leading technical schools in America.

For 25 years Dean Anderson was engineer of test for the Southern Railway Company and during that time developed many processes to improve railroad operation.

In 1921 Dean Anderson was appointed Director of the Research Laboratory of the A.S.H.V.E., located in the Bureau of Mines, Pittsburgh, Pa., and served in this capacity until August, 1925, directing the work from his office at the University of Kentucky and making monthly trips to Pittsburgh. During the years he was Director of the Laboratory, many scientific papers were prepared under his direction and among the most important work carried on was the development of the comfort zone.

At the time of his death, Dean Anderson was interested in the building of a laboratory to study the effect of sunlight on plants and animals. This laboratory was made possible through the gifts of Percy H. Johnston, president of the Chemical Bank & Trust Company of New York.

At the 36th annual meeting of the A.S.H.V.E. in Philadelphia announcement was made of an endowment created by Thornton Lewis, president of the Society, for the F. Paul Anderson Medal, named in honor of the Dean, to be awarded to a member of the Society whose work or services in the field of heating, ventilating, or air conditioning was outstanding. The first award of this gold medal was made to W. H. Carrier in 1932.

In 1927, Dean Anderson was elected president of the American Society of Heating and Ventilating Engineers, having served on the Council from 1924 to 1928, as first vice-president in 1926 and second vice-president in 1925. He also served on a number of A.S.H.V.E. committees, including the executive committee, publication committee, and the committees responsible for the development of the codes for minimum requirements, testing fans and blowers, and boiler testing.

Dean Anderson is survived by his widow, Mrs. Josephine Fisher Anderson, an only daughter, Mrs. R. W. Bozeman, of Cleveland, a son, F. Paul Anderson, Jr., of Millburn, N. J., and two grandchildren.

Funeral services were held in Memorial Hall on the Campus of the University of Kentucky, and burial was in Lexington Cemetery.

NEWS OF THE MONTH

President Roosevelt Says Industry Must Pay for Code Administration; Failure Means Code Violation

WASHINGTON—President Roosevelt on April 14 authorized NRA to approve collection of code administration expenses from industry members and make those who fail to pay subject to prosecution for code violation.

An order issued by Administrator Hugh S. Johnson simultaneously with the White House's mandate defines the procedure under which rates and budgets would be approved. General Johnson emphasized that those subject to several codes would be assessed, with certain exceptions, only for the support of the code authority which represents their principal line of business.

The administrator's order prescribes the form of assessment to which the authorities must adhere. Ruling on such applications will not be made until after July 15, by which time it is expected a series of intercode authority conferences will have solved most of the problems in this field.

The Johnson order states that code authorities must give prescribed notice to all industry members and allow a 15-day period for protest against assessment. Thirty days after that the firm subject to assessment which was not protested must pay up or lose its eagle.

President Roosevelt's order points out that any authority seeking to collect assessment must first have its budget approved by Administrator Johnson.

It is known that NRA officials have received numerous complaints that assessments were going to maintain not only high-salaried officers, but luxurious offices to accommodate those who had found organization of code groups a new way of making an easy living.

The new order recalls the statement of A. W. Wrieden, of the Warm Air Furnace Code Authority, before the NRA Conference March 5, and reported in HEATING AND VENTILATING last month, that some manufacturers were not willing to pay their share of maintaining The Code Authority.

Meyer New V. P. of Building Congress

NEW YORK—The New York Building Congress held election of officers at its 13th annual meeting at the Hotel Commodore, April 25. The following officers were elected for the fiscal year, April 1, 1934 to March 31, 1935: president, Harris H. Murdock; vice-presidents, John J. Collins, Thos. S. Holden, Henry C. Meyer, Jr., Jere L. Murphy, and Daniel T. Webster; treasurer, Benjamin D. Traitel; secretary, E. L. Strickland.

Mr. Meyer is a member of the consulting engineering firm of Meyer, Strong and Jones.

An official motion picture of the construction of Boulder Dam was shown through the courtesy of the Babcock and Wilcox Company, which has the second largest contract on the dam. Harris H. Murdock, president of the Congress, presided at the meeting.

LAST MINUTE NEWS

As we go to press news reaches us that the Administration, in order to stimulate building, is committed to move in the direction outlined in the Walker plan, described on page 37.

Toonder, McWan, Hogan Address Detroit Meeting

DETROIT—About 150 members and guests met at the Hotel Wardell for the April meeting of the Michigan chapter, A.S.H.V.E. C. L. Toonder, of the Kelvinator Corporation, gave a discussion of the Kelvinator humidity chart.

The second speaker was E. E. McWan, sales engineer, Air Conditioning Department, Frigidaire Corporation. Mr. McWan stressed the importance of well-trained salesmen in the air conditioning field, and gave some interesting statistics relating to air conditioning.

E. L. Hogan, air conditioning engineer, American Blower Corporation, discussed some of the technical points of the industry.

Consulting Engineers Form Own Division

CHICAGO—A petition has been presented by a group of members of the Western Society of Engineers asking the Board of Directors to authorize the formation of a Consulting Engineers Division. The Board approved the petition with certain minor exceptions.

The purpose of this division will be to promote the practice of engineering as a profession, to foster the observation of ethical principles in such practice, to encourage public understanding and recognition of those principles, to increase the usefulness of the profession to the public at large, to advance the professional interests of engineers generally, and to provide a forum for members for the discussion of matters affecting their professional relations to the public, to clients, and to other engineers.

Membership in this division is to be limited to those who are engaged in private practice as independent consulting engineers.

Museum Collecting Old Heaters

WASHINGTON—The United States National Museum, Smithsonian Institution, has begun a collection of old heating equipments for its collection of relics of important American industries.

So far the Museum has acquired a large seven-plate iron box stove of 1817, the cast-iron combustion chamber of a warm-air furnace of about 1850, several fireplace stoves and grates, and a number of Patent Office models of old heaters.

Principles of Economical Heating Discussed at Meeting of New England District Heating Group

BOSTON—"The Principles of Economical Heating" were described and discussed at the second annual spring meeting of the Boston section of the National District Heating Association, held at the Parker House, April 10.

The meeting was opened with a brief address by the toastmaster and chairman of the section, D. S. Boyden. Mr. Boyden explained briefly the aims and objects of the section and pointed out that Boston was the first city to organize a local N.D.H.A. chapter.

R. M. Nee, secretary of the section, then sketched briefly the history of the chapter since its inauguration in 1932.

G. J. Sherrard, of the Parker House, was scheduled to address the meeting but was unable to attend. In his absence I. E. Moultrop, chief engineer of the Edison Electric Illuminating Company of Boston, described the Parker House plant, which he said is a typical example of an isolated plant in good condition and well operated.

W. T. Jones, president of Barnes & Jones, Inc., spoke on heat loss from buildings. The greater part of heat loss, Mr. Jones said, is through windows and skylights, while a secondary loss is due to air change. The speaker explained the stack effect of tall buildings and mentioned other sources of heat loss, such as infiltration. He said that recent studies indicate that the higher the temperature of the ventilating air, the more air is needed for proper ventilation. In closing, the speaker discussed short hour heating.

Dissenting opinions on Mr. Jones' talk on short hour heating were voiced by several speakers, including M. D. Engle.

Temperature or heat control was the subject of a paper by M. K. Bryan, of Chas. T. Main, Inc. He discussed the selection and operation of various types of heat control, and stressed the importance of solar radiation, temperature, and wind velocity in their combined effect on heat control.

E. W. Gray, of the E.E.I. Co. of Boston, presented a paper on "Methods of Making Savings in Heating Systems." The shutting off of heat as much as possible every day, installation of separate supply lines where 24-hr. service is required in some parts of the building, proper maintenance of traps and vents, and adequate insulation were covered briefly. The importance of heat recovery from the condensate was emphasized, as was use of heat from condensate for heating the hot water supply.

H. W. Frederick, Harvard University, spoke on convenience and ease of the operation of heating systems. He closed his talk by giving 24 general rules for economical heating, and made an appeal for the universal acceptance of the degree-day as a unit in checking heat consumption.

G. A. Orrok, Jr., of the E.E.I. Co. of Boston, explained to about 20 members the condensate recovery system in use at the hotel by taking them to the engine room and showing them the plant.

Ninety-five persons were present at the meeting and 62 at the dinner held prior to the meeting.

Pulverized Coal Being Tried for Heating

CHICAGO—Discussions on various subjects of mutual interest to the industries represented on the Committee of Ten were carried on at an informal luncheon meeting of a majority of the Committee's members held here March 23. John C. Cosgrove, chairman of the Committee and official representative of the National Coal Association, presided.

Mr. Cosgrove presented a report of the various projects being undertaken by the coal industry, and particularly the continued efforts of bituminous coal people, through the Research Committee of the National Coal Association, to launch the initial activities of Bituminous Coal Research, Inc. He touched briefly on the developments now under way in various parts of the country with reference to the burning of pulverized fuel in homes and small buildings and mentioned experiments being carried on in several mid-western cities to furnish completely automatic heat with this type of fuel and equipment.

Norge Enters Oil Burner Field

DETROIT—Norge Corporation, manufacturer of refrigeration and other home appliances, announces its entrance into the oil burner field, effective May 1. Distribution will be accomplished in time to launch a summer and fall sales drive.

The Norge oil burner division will be under the sales executive direction of H. E. Whittingham. Ralph A. Beale, formerly sales manager of Silent Automatic and Toridheet, will be in active charge of all sales operations.

Coppus Appoints Cecil

WORCESTER, MASS.—Coppus Engineering Corporation announces the appointment of Lawrence K. Cecil, 1531 East 35th St., Tulsa, Okla., to handle sales in the Oklahoma and Texas territory.

Jersey Dealer Moves

NEWARK, N. J.—Air Conditioning Corporation, with main offices at 382 Central Ave., Newark, has opened new headquarters at 375 Main St., Hackensack, N. J.

The Air Conditioning Corporation is a General Electric Company dealer.

New Member on Oil Burner Code Authority

WASHINGTON — Harold V. Engh, vice-president, Anaconda Wire and Cable Company, was appointed Administration Member of the Code Authority for the Oil Burner Industry on April 13. Mr. Engh lives in New York.

Berry, Voorhees, Coefield on H.P.& A.C.C.N.A. Program

NEW YORK—Major George Berry, NRA divisional administrator, will address the 45th annual convention of the Heating, Piping and Air Conditioning Contractors National Association at Atlantic City. The convention will be held at the Ambassador Hotel, May 22-25. The directors and secretaries will meet prior to the convention opening. The tentative program follows:

Tuesday, May 22—A.M.

Welcome—Mayor of Atlantic City.
Welcome to New Jersey—Harry Geiser.
President's Address—R. D. Williams.
Report of Treasurer—John H. Zink.
Address—"The National Recovery Program," Major George Berry, Divisional Administrator, N.R.A.
Report of Secretary—Joseph C. Fitts.
Address—"Labor and the Recovery Program," John Coefield, president, United Association of Journeymen Plumbers and Steam Fitters.
Report of Educational Director—Dr. S. Lewis Land.
Address—"The Construction Code and Its Administration," Stephen F. Voorhees, chairman, Construction Code Authority.
Discussion of Code Situation.

P.M.

Meeting of Divisional Code Authority.

Wednesday, May 23—A.M.

Report of Membership Committee.
Report of Committee on Standards—George P. Nachman, chairman.
Address—"Radiator Convectors," Prof. A. P. Kratz.
Report of Committee on Air Conditioning—J. Lawrence DeNeille, chairman.
Address—"Air Conditioning in 1934," Willis H. Carrier.
Report of Committee on Welding—John H. Zink, chairman.
Report of Sub-Committee on Boiler Output—Harry M. Hart, chairman.

P.M.

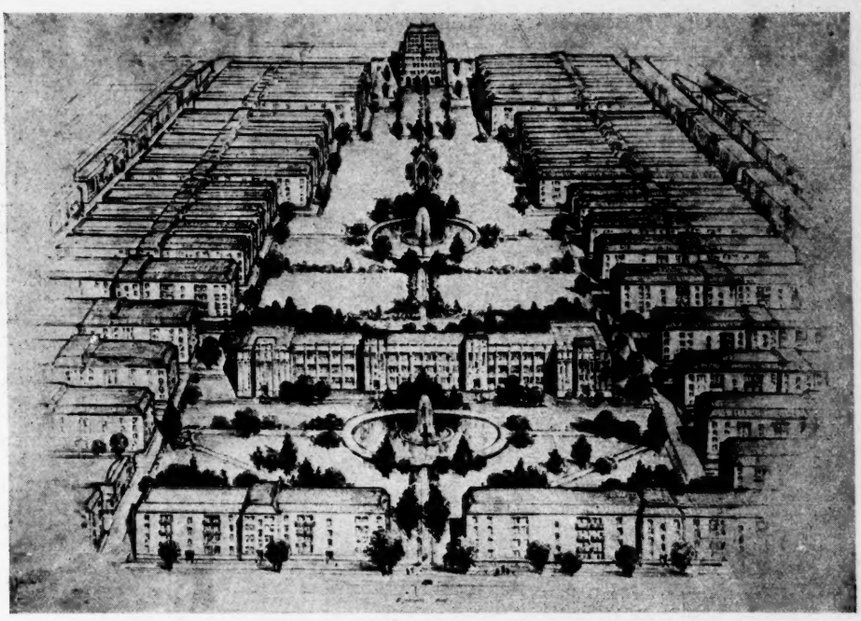
Meeting for discussion of Regional, State and Local Code Administration.

Thursday, May 24—A.M.

Papers by Members of Association Managers' and Secretaries' Conference.
Report of Committee on Trade Promotion—Walter Klie, chairman.
Report of Committee on Certified Heating—C. P. Finke, chairman.
Address—"Selling Modernization in 1934," John Campbell, assistant sales manager, American Radiator Company.
Report of Divisional Code Authority.

Friday, May 25—A.M.

Report of Committee of Ten—Coal and Heating Industries, Harry M. Hart.
Report of Convention Committees.
Election of Officers.



LOW COST HOMES FOR 9,768—WORK FOR 4,000 MEN

Tentative sketch of an $18 million housing project designed by architect Charles S. Duke of Chicago. A 100-acre site is called for bounded by 35th and 39th Streets, Cottage Grove and Rhodes. Plans call for 4,784 apartments to house 9,768 persons.

Boston A.C. Bureau May Hold Exhibition

BOSTON—A busy summer is ahead for the Air Conditioning Bureau of Boston. Work will be continued right through the season toward a Four Year Plan of advertising and sales promotion of air conditioning throughout the New England territory. A good start has already been made on this coordinated "push" of manufacturers, utility companies, dealers and contractors, for advertising matter will soon be sent out in furtherance of the campaign. The Bureau officials are also laying plans for a public exhibition of air conditioning equipment in June.

The Bureau was formed some months ago to (1) advance the use of air conditioning equipment by the public, (2) collect statistics and other factual data on conditioning, and (3) aid its members in selling equipment or services. Julius Daniels of the Boston Edison Company is president of the Bureau.

Hogan Addresses Ontario Chapter

TORONTO—E. L. Hogan, American Blower Corporation, spoke on air conditioning at the monthly meeting of the Ontario chapter of the A.S.H.V.E., April 2. The questions asked by the audience following his address indicated the interest in the subject and the abundance of thinking done by the chapter members during the talk.

The nominating committee submitted the following names for officers of the chapter for the year 1934-35: president, W. R. Blackhall; vice-president, M. W. Shears; secretary-treasurer, H. R. Roth; board of governors, J. S. Paterson, G. E. Playfair, T. McDonald, W. P. Boddington (retiring president, non-elective).

The May meeting will be a closed one and will be in charge of a committee consisting of H. H. Angus, chairman, R. Jenney, T. McDonald, and J. S. Wood.

Herty Promoted

BROOKLYN—Frank B. Herty, supervisor of the house-heating division, Brooklyn Union Gas Company, has been made retail sales supervisor of the company. He has been succeeded by James J. Deely.

Mr. Herty has been supervisor of house-heating since 1930, and Mr. Deely has been a member of that division since he first joined the company in 1930.

Kohler on Committee Urging Improvement in Durable Goods Industries

WASHINGTON — Demanding that Congress at this session amend and liberalize the Securities Act of 1933 so that durable goods industries can immediately secure new and needed capital and permanently re-employ many million skilled men heretofore engaged in this work, The Committee on Durable Goods Industries on April 12 agreed to so notify all Code Authorities and code committees in the United States. In addition they immediately communicated the decision to all their members to inform their stockholders, employees, and customers of this decision. The Committee claims to represent a group that in normal times employs more than 50% of all labor engaged in manufacturing.

According to the Committee, since the depression began only 4% of new capital has been secured for the making of durable goods, while in Great Britain new capital for the same industries has risen to 54%. The Committee has also definitely discovered that with new capital insured for these industries, between five and six million persons now unemployed in these industries could be permanently re-employed. Without amendment to the Securities Act of 1933 at this session of Congress the committee agrees unanimously that any recovery is only temporary and not permanent.

Members of the committee who attended the meeting and unanimously agreed on the action were George H. Houston, president, Baldwin Locomotive Works; Walter J. Kohler, C. R. Messinger, George P. Torrance, Lewis H. Brown and Harry S. Kimball. Other members of the committee of 16 have all been notified of the decision and will also support the plan.

Frigidaire Expands A.C. Division

DAYTON — Expansion of the air conditioning activities of Frigidaire Corporation, subsidiary of General Motors, was announced April 21 by H. W. Newell, vice-president in charge of sales, with the appointment of four men to key positions in Frigidaire's national organization.

J. J. Nance, manager of Frigidaire's Air Conditioning Division.

J. J. Nance, long a member of Frigidaire's headquarters staff and for the last few years manager of the sales planning division, has been named manager of a newly-formed air conditioning division. J. C. Chambers, member of Frigidaire's field organization since 1919 and for the last two years sales manager for air conditioning products, becomes sales manager of the air conditioning division.

L. E. Smith, well known as the head of Frigidaire's sales engineering and refrigeration application division, has been named manager of a section devoting its attention to sales engineering and application of air conditioning products, and Frank C. Lyons, for many years associated with Frigidaire's central office and one-time branch manager at Washington, D. C., becomes director of air conditioning education.

Describes Bank Job to Chicago Group

CHICAGO—P. L. Davidson, assistant manager, Philadelphia district, Carrier Engineering Corporation, described the air conditioning installation in the Philadelphia Savings Fund Society Building at the April 9 meeting of the Illinois Chapter, A.S.H.V.E., held at the Hotel Sherman, Chicago.

Mr. Davidson emphasized the necessity of close cooperation between the architect and the air conditioning engineer. He concluded his talk with a brief outline of the present stage of the art of air conditioning.

It was incorrectly reported on these pages last month that John Howatt had been elected president of the Illinois Chapter for the coming year. This was in error, as Mr. Howatt was elected a member of the Nominating Committee of the Chapter. Others elected with Mr. Howatt on the Nominating Committee were: C. W. DeLand; J. J. Aeberly; R. E. Hattis; J. H. Milliken; J. J. Hayes; J. J. Haines.

Urge Ventilation in London Offices

LONDON — Fifty women stenographers visited the House of Commons recently to urge members of Parliament to support a bill for better ventilated and lighted offices. The bill, known as the Offices Regulation Bill, was introduced by Will Thorne, M.P., who met the young women as they arrived at the House after leaving work.

The deputation, headed by Miss B. A. Godwin, organizing secretary of the Association of Women Clerks and Secretaries, sent in cards to the Parliament members for their own divisions. As the members came to the lobby the women stated their case. For four hours there was a steady stream of ardent and voluble young women demanding to see their division members. In most cases they were successful in securing an interview, but they were not so successful in obtaining a pledge from the members for support.

Passage of the bill appears probable and will mean the immediate placing of large orders for ventilating plants in order to bring old London offices up to the required hygienic standard.

Steam Rates Cut

PHILADELPHIA—Effective April 16, the Philadelphia Electric Company appreciably lowered its rates for steam. The cut applied to both the demand and consumption rate.

American Radiator to Start 3½ Month Campaign on Heating Modernizing in May; Heating Contractors to Benefit

NEW YORK—A three and one-half months' nation-wide heating modernization campaign will be opened this month, with the American Radiator Company acting as sponsor to supply dealer aids for the drive. Every legitimate heating contractor in the United States will be urged to join in the movement, the keynote of which will be an effort to create business for the contractor and a greater interest in good heating, rather than an effort to sell any particular piece of equipment, according to Arthur R. Herske, American's vice-president and general manager of sales.

As a forerunner to the whole campaign, the company on March 19 inaugurated a newspaper and advertising program that departed from its traditional policy of advertising individual products to stress the importance of good heating.

"We feel," Mr. Herske declared, "that as an established leader in our industry we have a definite responsibility to take the leadership in an intelligent campaign for heating modernization that will be beneficial both to the heating contractor for whom it will create business and to the general public who will benefit by the increased industrial activity and by the improved living conditions that will result.

"The purpose will be to aid the heating contractor to provide better living conditions. Small changes in heating systems that the contractor can make with only a minimum of new equipment will be urged just as strongly as will changes where a large amount of equipment is required, where those small changes will provide the necessary improved living conditions.

"We are going to be careful in the campaign not to frighten any one into believing that he must buy a large amount of equipment to correct existing difficulties with his heating system. From a business point of view, we believe that this policy will open more doors to the dealers cooperating in the drive, create more general business for the heating contractor, and in the end produce results that will be more than gratifying to our own company.

"To carry out this policy, the campaign will stress good heating, and American Radiator products will enter into it as they are needed to provide that good heating."

In the drive, literature and other aids provided to the dealer will stress his name rather than that of the American Radiator Company. An effort will be made to capitalize on the low temperatures of the past winter and urge homeowners to remove deficiencies in their heating equipment that were disclosed during this cold weather.

To catch the attention of the public, the American Radiator Company has devised for its advertising program the term "cold zone," which it describes as "drafty chilly spots that could not be heated." This same term will be used in the modernization campaign, and sales appeals will be built around it. Within the heating industry, the drive will be known as the "In the Black in '34" campaign, and will supplement the "Out of the Red in '32" campaign that the American Radiator Company sponsored.

Barnum Represents Waterman-Waterbury

NEW YORK—Marvin C. Barnum has been appointed representative for The Waterman-Waterbury Co., Minneapolis, manufacturer of warm-air furnaces and air conditioning equipment. Mr. Barnum has established headquarters at 1133 Broadway, New York, from which he will cover his territory which includes metropolitan and upstate New York and New England.

Mr. Barnum was formerly connected with the Zephyr Washed Air Company and more recently with the Aqualator Division of the Wilcolator Corporation, Newark.

N. Y. Group Hears Talk on Street Steam

NEW YORK—A. R. Mumford, New York Steam Corporation, and William J. Baldwin, Jr., secretary of the corporation, were the guest speakers at the regular monthly meeting of the New York chapter of the A.S.H.V.E., April 16. Mr. Baldwin and his associates prepared the paper, presented by Mr. Mumford, and which covered the subject of steam service controls.

The speaker described in some detail the apparatus used in the service connections of the utility, including pressure reducing valves, explained the progress which has been made by the corporation in obtaining load through steam jet refrigerating machines, and finally outlined briefly the various methods of control which had been developed during the last few years.

In connection with the steam jet refrigeration, Mr. Mumford said that the Cities Service tower, hot-water heated, was showing, according to preliminary records, a steam consumption per degree day per 1000 cu. ft. about 30% less than the average of similar buildings steam heated. He mentioned the work which has been done by the company in assisting in zoning a number of large buildings in New York in order to obtain steam economy.

The paper was commented on by Harold Alt, president of the chapter, T. N. Adlam, W. W. Timmis, and others.

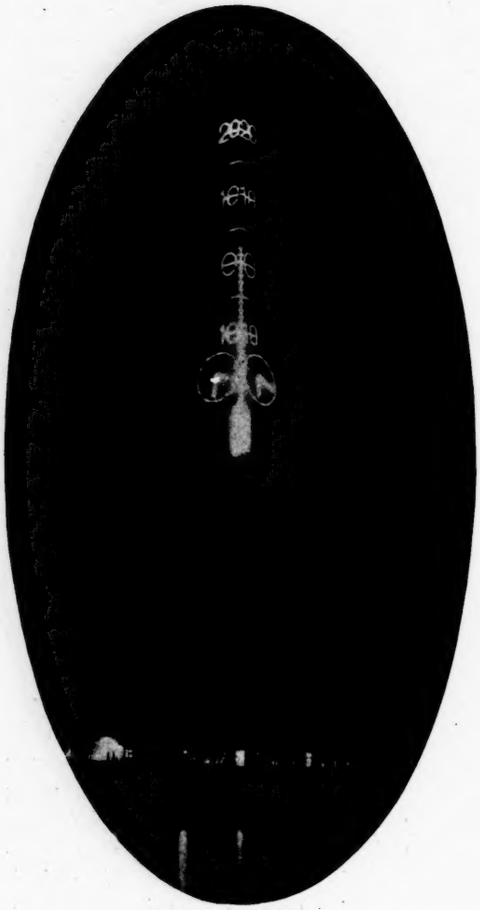
Officers for the coming year were elected as follows: president, H. W. Fiedler; vice-president, W. W. Timmis; treasurer, W. M. Heebner; secretary, T. W. Reynolds; board of governors, A. F. Hinrichsen, S. A. S. Patorno, H. L. Alt.

New A.C. Division Considered

NEW YORK—In an effort further to increase interest of members, particularly younger engineers, the Metropolitan Section of the A.S.M.E. is considering the formation of a group to meet and discuss air conditioning.

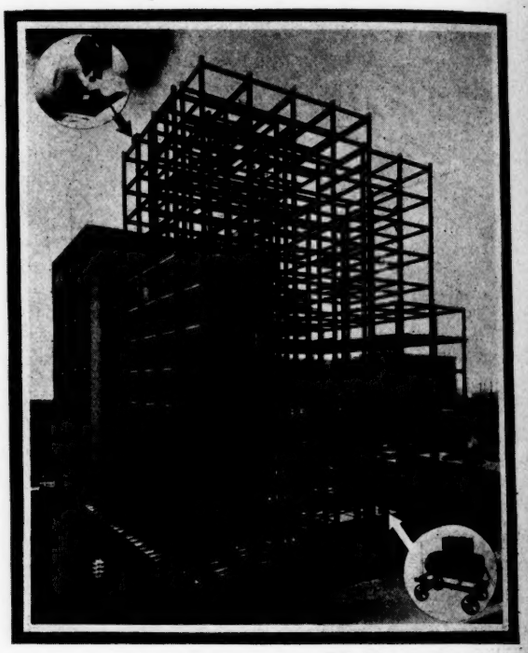
Picture Paragraphs

↑ A 1904 BUICK was used by The Laclede Gas Light Company to advertise gas house-heating to St. Louisans. The car was reconditioned by the Gruhhala brothers, of the by-products coke department. L. to r.: J. H. Doerres, E. W. Blind, and the Gruhhala brothers.



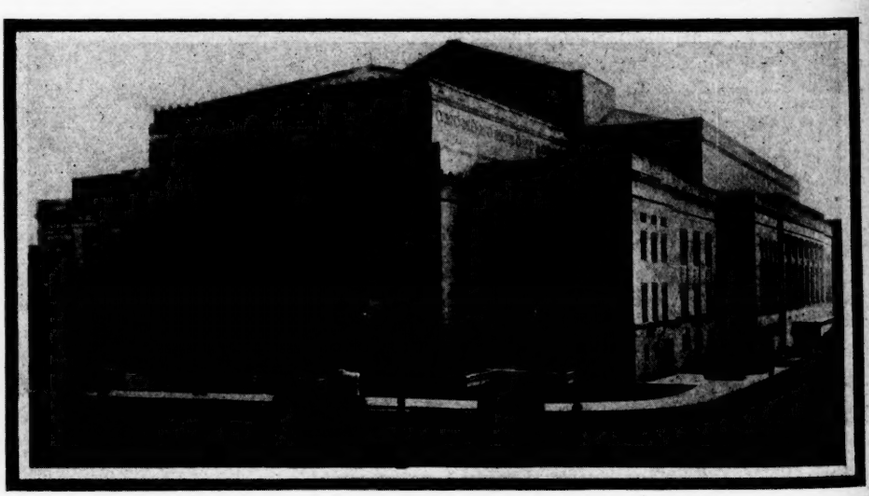
International News

↑ FRANCE WINS. The 924 ft. Eiffel Tower takes record for world's largest thermometer away from Atlantic City. The Paris thermometer, which registers in Centigrade degrees, is visible for miles. The same structure houses the largest clock, erected by Citroen.



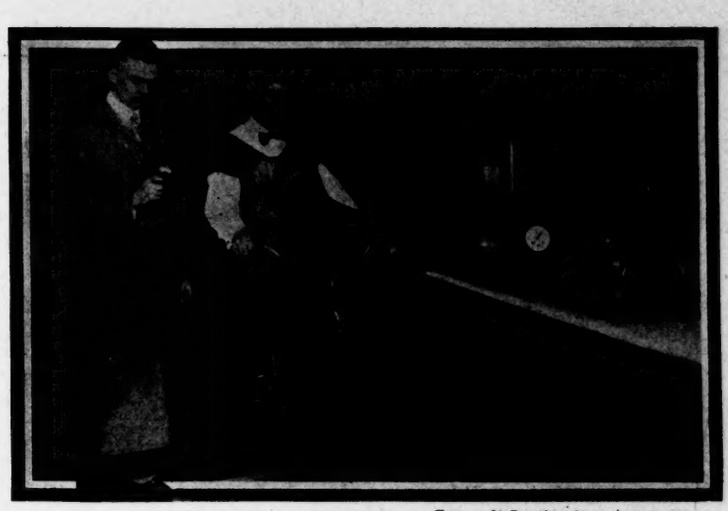
The Lincoln Electric Co.

↑ SAVING $500 PER YEAR PER WELDER by use of a remote control for arc-welding machines. The welder, upper left, taps his electrode on the work. The generator, lower right raises the voltage. Larger number of taps, voltage is lowered. No other control needed.



A 15,000 SEAT ARENA, a ⟶ 3563 seat music hall, a 94,000 sq. ft. exposition space are among the features of the air conditioned five million dollar St. Louis Municipal Auditorium, opened April 14. The cooling system can maintain a 15° differential.

OVER 2500 B.T.U. PER HR. is the heat emission of a man riding a bicycle to the limit of his endurance. Man's activity determines his heat emission, important in designing cooling systems. Story on Page 19.



Carnegie Institution of Washington

York Ice Machinery Corp.

←—"FOG HUMIDITY." Concrete for Boulder Dam is tested in a laboratory maintained at 70° with 100% relative humidity. Test specimens are thus cured under identical conditions with concrete in the dam.

Sovfoto

SOLAR BOILER, utilizing sun's rays, —→ heats domestic water supply in Russian experiments. Similar systems are used in California.

TASHKENT, UZBEKISTAN — The Geophysical Observatory here is conducting tests on boilers designed to harness the heat from the sun. ↓

Sovfoto

Comfort Conditions for Mickey Mouse

Los Angeles—An air conditioning system capable of maintaining a 15° differential below outside conditions will be installed in a new studio for Walt Disney Productions, Ltd. The studio will cost $50,000.

The expansion of the studios of the creator of Mickey Mouse is only a minor one compared to that planned by the big movie producers. RKO will spend $500,000 on new buildings; Columbia has started the first of a series of three units which will cost $350,000; M.G.M. has announced the most extensive building program since installation of sound stages; Fox has begun spending nearly $200,000 on new structures, and Paramount's new building program calls for spending $100,000. General Service Studios has already laid the foundation for a new sound stage to cost $500,000.

Menke Leases

Newark—Anthony Menke, trading as the Ruby-Tyler Sales Company, air conditioning equipment specialists, has leased space in the Federal Trust Building, 24 Commerce Street.

Large Commercial Anthracite-Burning Heating and Refrigeration Plant Built in Pennsylvania

Pottsville, Pa.—The world's first combined commercial heating and refrigerating plant using anthracite coal was placed in operation in a large warehouse for the storage of meats and provisions here, April 22.

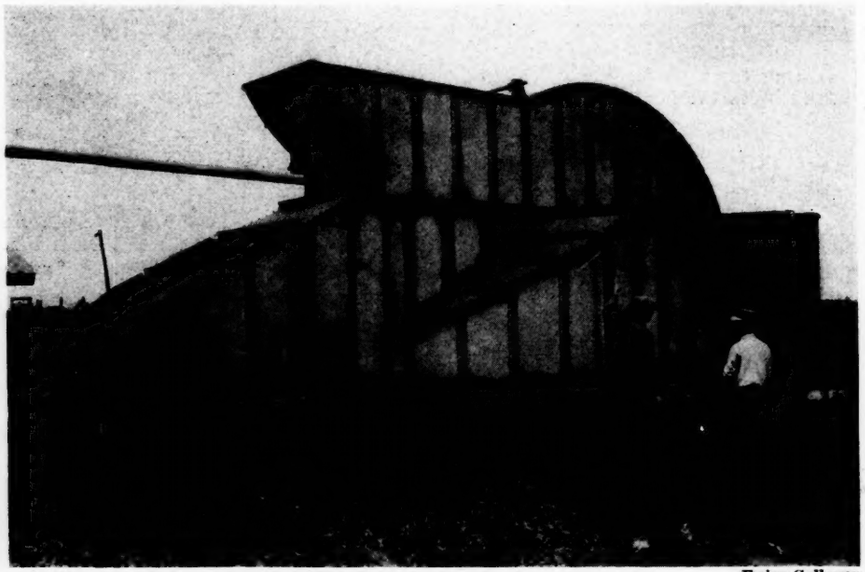
The plant is a development of the Pottsville laboratories of The Philadelphia and Reading Coal and Iron Company, owners and operators of coal lands in the Reading anthracite region, and was designed as a means of encouraging wider use of anthracite in industrial and commercial activities. Last year the company's laboratories announced the completion of an air conditioning furnace.

The principles applied in the manufacture of the furnace have been further developed in the production of the new commercial-type installation which will be of particular service to the meat, dairy, fruit, and provision industries and to restaurants and similar commercial establishments.

The Dohn Provision Company decided upon the installation of the new heating-refrigerating apparatus. This consists of an absorption refrigerating machine utilizing steam generated by the new furnace. A large meat storage room, 30 ft. x 60 ft. and 11 ft. 6 in. high, with a capacity of four or five carloads of meat at a time, will be air conditioned by the refrigeration plant operating a cold diffuser which is a radical departure from the conventional methods of refrigeration. There are virtually no moving parts in the entire installation, circulation being maintained by a small pump operated by a 1/3-hp. motor. The installation is compact and practically noiseless.

Provision has been made for heating the building in the winter time and supplying hot water to the establishment.

The plant was designed in the laboratory attached to the Pottsville shops of the company and was built there in the past two months by the staff of engineers and mechanics under the direction of John G. Reid, manager.



Ewing Galloway

A 250,000 c.f.m. ventilating fan for an Illinois coal mine. The fan is 12 ft. x 5 ft., and its principal duty is to force fresh air into the mine, but in emergency can be reversed and exhaust air from the mine.

Chicago Burner Men Combat Gas

Chicago—A meeting of oil burner distributors and dealers, sponsored by the Chicago Oil Burner Association, was held April 3 for the discussion of the possible improvement of marketing conditions in the Chicago district. One of the objectives of the meeting was to combat campaigns of Chicago utilities in selling and installing gas conversion burners.

Activities of the association at the present time have been extended to contest the retailers' occupational tax. The association believes that the oil burner dealer should not be responsible to this state for the payment of the tax.

The industrial group of the local oil burner dealers held a meeting March 26 for the purpose of further coordinating the efforts of those interested in industrial burners and an attempt to crystallize sentiment among such dealers regarding problems which the various members have in common.

Century of Progress to Show Modern Homes

CHICAGO—The modern home in its new architecture, with latest equipment for labor-saving and for health, will be special features of the World's Fair of 1934. Three small country homes, including two farm homes, have been added to the exhibit of houses completely furnished, decorated, and equipped for living. The 10 small houses in the Home and Industrial Arts group will be entirely refurnished and redecorated. New ideas developed in the past months and from the experience of last year's Fair will be seen.

The Country Home, developed by George Fred Keck, presents a different type of farmer's dwelling in which the emphasis is laid upon giving the rural family all modern comforts. The heating plant will be located on the ground floor.

An entirely new all-steel house will be built in the group by General Houses, Inc. Advance of ideas in this type of pre-fabricated construction during the past year will be shown. The house built of steel-panel units will include five rooms and a built-in garage.

The colored crystal palace of the Owens-Illinois Company, built of glass bricks with an illuminated glass tower, is to be entirely redecorated inside.

Cooling for St. Louis Statler

ST. LOUIS—A contract has been signed by the Statler Hotel and the York Ice Machinery Corporation for installation of added air cooling equipment.

Air conditioning will be extended to the Cafe Rouge, to the Daniel Boone room, and to three new private dining rooms.

Code Authority Members Appointed

WASHINGTON—NRA Administrator Hugh S. Johnson has announced the appointment of D. V. Stratton, president of Johnson Motor Co., Waukegan, Ill., as Administration member on the Code Authority of the Cast Iron Boiler and Cast Iron Radiator Industry.

Lieut.-Col. John W. Hallock, Engineer Reserves, assigned as Chief of the Pittsburgh Engineer Procurement District, has been appointed as Administration member on the Code Authority for the Pipe Nipple Manufacturing Industry.

Hutzler's Gets Fluid Heat

BALTIMORE — Hutzler Brothers Company, large Baltimore department store, has secured the franchise covering retail sale of Fluid Heat oil burners in the Baltimore territory. Installation and service will be supplied by the manufacturer.

According to W. F. Brannan, president of Fluid Heat, the company's branch office located at 2434 No. Charles Street has been closed. Frederick Schauss, manager of Baltimore retail sales, is now in charge of Hutzler's Oil Burner Department and the regular Fluid Heat selling staff has been engaged by the store.

G. E. Holds Dealers Meetings

SCHENECTADY, N. Y.—The Air Conditioning Department of the General Electric Company conducted a series of regional meetings in 11 cities starting April 2 and finishing April 20. The meetings were held for the purpose of acquainting dealers, sales managers, and salesmen with new plans for the coming year. Cities visited were Boston, Schenectady, New York, Richmond, Philadelphia, Cleveland, Chicago, Minneapolis, St. Louis, Kansas City, and Omaha.

At these regional conventions an announcement was made of a sales contest for air conditioning dealers and their salesmen, the prizes being trips to Bermuda.

Included on the programs and among those who toured the 11 cities were J. J. Donovan, manager of the Air Conditioning Department; W. A. Bowe, advertising manager, Air Conditioning Department; Elliott Harrington, commercial engineer; R. S. Thurston, air conditioning sales; E. C. Lewis, new construction; W. A. Scherff, oil furnace sales; A. C. Roy, merchandising promotion; H. B. Smith, gas furnace sales, and E. J. Opal, manager, Merchandising Division.

Mott Iron Works Sold

NEW YORK—Harry A. Robinson, 300 Morris Building, Philadelphia, has purchased from a holding corporation the stock, patents, dies, molds, fixtures and good-will of The J. L. Mott Iron Works, Trenton, N. J. This company, which has been in business for over 100 years, was formerly the third largest plant in Trenton.

Purchase included the plant of approximately a million square feet of buildings and 18 acres of ground, complete for the manufacture of hot water and steam boilers and plumbing wares.

Mr. Robinson reports that large foreign interests are now negotiating to acquire the plant, with the intention of continuing the manufacture of the J. L. Mott lines.

The original J. L. Mott Company went into receivership in 1924 and employed 1,250 persons before it closed two years ago. The holding corporation, which sold the plant, consists of three large New York banks and Mrs. Andrew Carnegie. It took control at a receiver's sale in June, 1932, with a bid of $25,000, in addition to retaining $1,000,000 in mortgages already held by the three banks and Mrs. Carnegie.

Campbell to Use Jobbers

BOSTON—Effective May 1, the unit sales distributorship for the Campbell unit air conditioner, maintained in cooperation with the Jordan Marsh Company department store, Boston, was discontinued. Unit sales are to be handled exclusively by the New York office of the Campbell Metal Window Company. The country in general will be supplied through jobbers.

Air Conditioned Courtrooms for Missouri Courthouse; Kansas City Bank Also to be Conditioned

KANSAS CITY MO.—As though they were 11 theaters of the better-equipped sort in a single lofty structure, the courtrooms of Jackson County's future courthouse will have that ultimate touch of modernity, air conditioning with cooling. Walter E. Gillham, consulting engineer, designed the conditioning system.

Probably more than $50,000 will go into the extensive air conditioning system for the lofty structure on a square block site bounded by Oak and Locust Streets, Twelfth and Thirteenth Streets. Something like $18,000 of that amount will be expended for the cooling part of the system.

Because of large glass areas in the big rooms and 2-story ceiling height, heating equipment of greater capacity than usual will be required. Only the courtrooms will have air conditioning.

According to Mr. Gillham, each courtroom will require from 10 to 12 tons of refrigeration each 24 hr., depending on the size and location. Each courtroom will be provided with its own air conditioner or dehumidifying and humidifying unit which will be operated independent of all other units. Each unit is located on a mezzanine floor adjacent to the courtroom it serves.

The compressors will be located in the basement. The refrigerant used is freon.

Mr. Gillham is also consultant for the Federal Reserve Bank building, now under construction at Tenth Street and Grand Avenue, for which he has designed a $60,000 conditioning system.

Condition Baltimore Store

BALTIMORE—Chatard & Norris, Inc., agent for Auditorium Air Conditioning Systems, reports the installation of air conditioning apparatus in the first floor and basement of Hutzler Brothers Company, large department store at 212 N. Howard Street here.

Apparatus includes Westinghouse steam jet equipment and American Blower ejector outlets. Steam supply will be furnished by the Consolidated Gas, Electric Light & Power Company.

Herbert G. Crisp and James R. Edmunds, Jr., were the architects, and James Posey the engineer.

Cooper in Charge of Thermal Units Sales

CHICAGO—John R. Cooper, for the last six years eastern branch manager of Thermal Units Mfg. Co., Chicago, assumed the position of sales manager of the company May 1. Mr. Cooper is located at the main office at Pershing Road & Loomis Street.

The Arctic Engineering Co., 123 White St., New York, will represent Thermal Units in the New York territory.

Foster Elects Officers

NEWARK, N. J.—The Foster Engineering Company, manufacturers of automatic pressure control devices since 1879, at its annual meeting elected the following officers: chairman of the board, R. C. Anderson; president, William F. Krichbaum; vice-president, Fergus Reid, Jr.; treasurer, James T. Hayden; secretary, William E. Heck; assistant secretary-treasurer, G. S. Geortner.

The following directors were elected: Mr. Anderson, Fergus Reid, Sr., Fergus Reid, Jr., Mr. Krichbaum, Mr. Hayden, Fred T. Schilling, Stephen Farrington, Ernest C. Lum, and Harry T. Wentworth.

The annual report of the president indicated a noticeable increase in business, particularly since the first of the year.

Ching New President of English Engineers

LONDON—R. Comyn Ching was inducted into office as president of The Institution of Heating and Ventilating Engineers at the Institute's annual general meeting, held in the London School of Hygiene and Tropical Medicine here February 14.

Mr. Ching became a member of the Institution in 1917 and a member of the Council. He has been president of the National Association of Heating, Ventilating and Domestic Engineering Employers and was also a member of the National Joint Industrial Council.

In presenting the report of the Research Committee, Walter Nobbs stated that representatives of the Research Committee and of the Government Department concerned had conferred recently and approved what they hoped would be the final design for the Controlled Weather House, and that a handsome contribution to the research fund had been received from the electrical industry.

W. H. Rogers was awarded the bronze medal of the Institution for his paper "The Practical Side of Ventilation."

Sir Leonard Hill, an honorary member of the Institution, presented a paper on "Infra-Red Rays and Comfort" which was followed by a lengthy discussion. Sir Leonard concluded that the short infra-red rays are more comfortable than the longer rays and that when dull red or dark sources of heat which give off longer rays than bright rays are used, their stuffy action should be counteracted by ventilation.

Lewis Joins Link-Belt Stoker Div.

PHILADELPHIA—I. W. Lewis, formerly president of the Riddell Stoker Company, is now in charge of the eastern division sales of Link-Belt Company's underfeed stokers. His offices will be at the Philadelphia plant of the company, 2045 West Hunting Park Avenue.

O. B. Code Up for Public Hearing

WASHINGTON—Because of complaints concerning the approved code of fair competition for the Oil Burner Industry, NRA announced, April 20, through Deputy Administrator Barton W. Murray, a public hearing for May 8, for the purpose of determining whether, and in what material respects, that code may not be tending to effectuate the policy of Title I of the NIRA, and whether the code, or the order approving it, should not be modified.

The hearing will commence at 10 a.m. in the Auditorium of the Department of Commerce Building.

Acme Incorporates

SPRINGFIELD, MASS.—Acme Heating & Power Equipment Corporation of Springfield has been incorporated with capital of 5,000 shares, no-par stock. Frank T. Wyckoff and Richard H. Harper of Longmeadow, Mass., and Albert L. Coleman, Springfield, are the incorporators.

York Lands Chicago Job

CHICAGO—Westerlin & Campbell Company, representing the York Ice Machinery Company in this territory, has been awarded the contract for air conditioning three offices for W. H. Miner, Inc., in the Rookery Building.

The equipment is located in a closet near the offices. A 2-hp. compressor furnishes the cooling, with 850 c.f.m. delivered to the offices through ducts.

Another office installation for which the same company has the contract is in the offices of Pratt & Lambert, Inc., at 320 W. 26th Street. This is a single-room unit of 1½ ton refrigerating capacity.

Both of these installations are for complete year-round air conditioning.

Modernizing Theme of Address by Herske

DETROIT—A. R. Herske, vice-president and general manager of sales, American Radiator Company, talked on present conditions in the construction industry, and stressed the business to be had in improving existing buildings when he addressed the monthly meeting of the A.S.H.V.E. here March 19. C. V. Haynes, president of the National society, also spoke, as did Malcomb Bingay of the *Detroit Free Press*.

Vancouver Group Condemns Price Cutting

VANCOUVER, B. C.—Members of the Better Warm Air Heating, Ventilating and Sheet Metal Works Association in a recent meeting decided to adopt a trade code for members of the organization. The feeling of the meeting was definitely in favor of eliminating, if possible, the price cutting and other unfair practices which are known to exist and which are proving a detriment to their business as well as to the firm or individual having air conditioning, heating, or sheet metal work done.

Binns and Wilson Appointed by Revere

NEW YORK—C. D. Dallas, president, Revere Copper and Brass Incorporated, has announced the appointments of R. H. Binns, Jr., and S. H. Wilson, as assistant general sales managers, with headquarters in the general sales department, New York Central Building, New York.

"More in '34" is Iron Fireman Slogan at Convention

CLEVELAND—Over 400 dealers and salesmen from the United States and Canada attended the annual dealer convention of the Iron Fireman Mfg. Company, March 26-31. The attendance was the largest of any convention the company has held. The whole session was devoted to a factory and dealers' program, the objective of which is increased sales for the Iron Fireman line embracing bituminous and anthracite models for residential, commercial, and industrial boilers. The slogan adopted at the convention was "More in '34."

Prominent among the speakers were C. T. Burg, general sales manager, and Dale Wylie, sales promotion manager.

Iron Fireman now has over 800 dealers in the United States, Canada and foreign countries.

Dealers and executives of Iron Fireman Mfg. Company at their annual convention in Cleveland

New Instructions on P.W.A. Work

WASHINGTON — Revised requirements on bids, contracts, wages, labor provisions, and similar phases of work relating to PWA financed non-Federal projects have been published by the Federal Emergency Administration of Public Works.

The revisions are those of March 3, 1934, and are available in Bulletin No. 2, Non-Federal Projects. The full title is "P.W.A. Requirements as to Bids, Contractors' Bonds, and Contract, Wage and Labor Provisions and General Instructions as to Applications and Loans and Grants."

The bulletin can be obtained from the Superintendent of Documents.

Frank Heads Fan Manufacturers

DETROIT—J. M. Frank, president, Ilg Electric Ventilating Company, was elected president of the National Association of Fan Manufacturers at a recent meeting here. C. A. Booth, vice-president, Buffalo Forge Company, was named vice-president of the association, and E. B. Cresap, Chicago, was reelected secretary.

The Code Authority will consist of the following elected members: Messrs. Frank and Booth; C. T. Morse, president, American Blower Corporation; F. Herlan, vice-president, B. F. Sturtevant Company; R. R. Ware, general manager, Clarage Fan Company; L. O. Monroe, Detroit, secretary.

Hacker Speaks to St. Louis Chapter

ST. LOUIS—At the April meeting of the A.S.H.V.E., April 4, W. P. Hacker spoke regarding his experiences as an engineer in China. Mr. Hacker spent three years with an American firm having head offices in Shanghai and branches in other cities of China. This firm did general engineering and construction work and his duties consisted of design, supervision of installation, and operation of mechanical equipment. Mr. Hacker specialized in refrigeration, heating, ventilating, and air conditioning work.

The talk was illustrated with lantern slides showing life in China.

A spring trip is being planned by national president C. V. Haynes and he will meet with the St. Louis members May 9. On this trip president Haynes will be accompanied by John Howatt, first vice-president and chairman of the committee on research.

Do you have any Peck electric furnaces in your home? . . . If you do, Henry Ford will buy one for his Museum . . . Trouble with the heating system at Purdue University forced the school term to be held from March to November in 1898.

"Know how to heat and ventilate a house, important phases in home management" is Point 7 in 14 Points for Judging an Ideal Wife, according to Mrs. I. B. Langworthy, first vice-president of the National Congress of Parents and Teachers . . . One-quarter ton of refrigeration is required for every 31-gal. barrel of beer that is brewed . . . Also 1½ kw. of electrical energy and 800 lb. of steam . . . Japan's new Capitol, costing 26.5 million yen (over $13 million), was entirely built of Japanese-made materials, excepting the thermostats and mail chutes . . . Developments in the packaging of coal are moving ahead rapidly . . . The London *Daily Mail* held a Home Show April 3-28 . . . Nine complete houses with latest models heating and other appliances were featured.

Among those who appeared in favor of the proposed New York state bill to limit the mechanical ventilation in schools were Dr. C. E. A. Winslow of Yale; Dr. J. H. Hixson of the State Education Department, and C. A. Holmquist of the State Health Department . . . While among those opposing it were W. H. Driscoll of the A.S.H.V.E., and representatives of the State Federation of Labor . . . Estimates for air conditioning jobs in New York and Philadelphia are running two or three times the number made last year.

Hoffman Moves

NEW YORK—The Hoffman Specialty Company, Inc., recently moved its general sales department to 500 Fifth Avenue.

Revere to Distribute Streamline Fittings

NEW YORK—Arrangements have been completed whereby Revere Copper and Brass Incorporated will sell and distribute Streamline soldered fittings as manufactured by the Streamline Pipe and Fittings Co., Port Huron, Mich., a division of the Mueller Brass Company. This will not alter present selling plans of either company as regards other products, but will mean that both will have these fittings available for sale. Revere will use its mills as distributing points for the Streamline fitting.

Dominion Explains O.B. Boiler

TORONTO — The company's new boiler for use with oil-burning equipment was shown to a large number of representatives of wholesale houses and heating engineers by the Dominion Radiator & Boiler Company, Ltd., at a meeting in its Toronto office. An instructive and semi-technical address was made by George Maier, assistant general manager, American Radiator Company; John Skinner, vice-president and sales manager, D. J. McDonald, vice-president, and Hugh Jenney, all of the Dominion Radiator & Boiler Company, assisted Mr. Maier.

No State Code Contemplated

NEWARK, N. J.—The Heating and Piping Contractors North Jersey Association is ready to get underway as soon as the NRA code is signed, according to T. B. Cryer, treasurer of the association.

Harry Geiser, secretary, says that the association will not rush through a state code. "There are 47 codes in New Jersey still waiting to be acted upon," he said, "and we can operate under a national code for a while."

Mfrs. to Exhibit at Rochester

BOSTON—Arrangements have been made for manufacturer members of the N.D.H.A. to exhibit their products in a room adjacent to the reception room at the annual convention of the Association to be held in Rochester, N. Y., June 12-15, according to H. W. Coombs, secretary of the Manufacturers Division.

According to Mr. Coombs, time will be allotted by the convention for examination of exhibits. No charge will be made for the space.

John A. Sutherland

CHICAGO—John A. Sutherland, chief mechanical engineer of Holabird and Root, architects in this city, died last month following an illness of two weeks. He was 60 years old.

Born in Washington, D. C., Mr. Sutherland was noted for his work on many Chicago buildings. Graduating from George Washington University, he became associated with the supervising architect in the treasury department.

Mr. Sutherland came to Chicago in 1919, after serving in the quartermaster corps, construction division, during the war. He was with Holabird and Root since that time. In the spring of 1931, at the invitation of the Soviet government, he visited Russia.

Mr. Sutherland is survived by his widow and daughter.

NEW CATALOGS

The Brown Instrument Co., Philadelphia, has published a 32-page catalog featuring Brown resistance thermometers for measuring temperatures ranging from —300° to +1000° F.; standard size; 32 pages.

The Holtzer-Cabot Electric Co., 125 Amory St., Boston, Mass., has published two leaflets describing its line of motors for heating and ventilating applications. One is devoted to the company's motors for centrifugal fans, the other to motors for propeller fans. The folder describes the construction, performance, and applications of the motors, and gives dimensional and other catalog data; standard size.

Plibrico Jointless Firebrick Co., 1800 Block on Kingsbury St., Chicago, has published a new catalog entitled "Plibrico Refractory Construction." It covers the use and application of mouldable firebrick material and air-setting cement in connection with domestic and commercial installations of oil, gas, and coal burners. The book is of interest to contractors and dealers who install or service oil burners. Complete instructions are given for installation of the different types of refractory materials; 24 pages; 5½ in. × 8½ in.; available on request.

J. E. Rhoads & Sons, 35 North Sixth St., Philadelphia, has issued a four-page folder featuring the company's line of leather belting.

B. F. Sturtevant Co., Hyde Park, Boston, Mass., has published an attractive booklet illustrating and outlining the advantages of air conditioning in the textile, baking, candy, tobacco, flour, and brewing industries, and featuring typical Sturtevant installations in those industries; standard size, 12 pages.

B. F. Sturtevant Co., Hyde Park, Boston, has issued Bulletin No. 332-1, a four-page folder, standard size, describing and illustrating Sturtevant ventilating sets which come in six different sizes with capacity ranges from 80 to 1600 c.f.m.

Taylor Forge & Pipe Works, P. O. Box 485, Chicago, has published Catalog 34-1, devoted to its line of seamless steel fittings for welded fabrication. Contains dimensional and other specific engineering data, and a detailed discussion of the design of piping for flexibility. Includes charts and problems; standard size; 64 pages.

The Waterman-Waterbury Co., Minneapolis, has issued a bulletin describing Comfortrol air conditioning equipment manufactured by the company. The line includes an air washer-blower-filter unit and other equipment; 5½ in. × 8⅜ in.; 16 pages.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has published a four-page illustrated folder on "Quiet Operating Induction Motors," with particular reference to their use in buildings where it is essential that there be no objectionable noise.

COMING EVENTS

MAY 22-25, 1934. *Heating, Piping and Air Conditioning Contractors Convention, Atlantic City, N. J. Headquarters at the Ambassador Hotel.*

MAY 28-31, 1934. *Fifty-Second Annual Convention and Exposition of the National Association of Master Plumbers, in Washington, D. C., at the Washington Auditorium.*

JUNE 12-14, 1934. *Mid-Year Meeting of the National Warm Air Heating and Air Conditioning Association, Chicago, Ill. Headquarters at the Stevens Hotel.*

JUNE 12-15, 1934. *Twenty-Fifth Annual Convention of the National District Heating Association, Rochester, N. Y.*

JUNE 18-23, 1934. *Convention and Exhibit of the National Association of Building Owners and Managers, Toronto, Canada. Headquarters at the Royal York Hotel.*

JUNE 19-22 1934. *Annual Convention of the Smoke Prevention Association, Buffalo, N. Y. Headquarters at the Hotel Statler.*

JUNE 20-22, 1934. *Spring Meeting of the American Society of Heating and Ventilating Engineers, Buck Hill Falls, Pa. Headquarters at The Inn.*

JUNE 20-22, 1934. *Spring Meeting of the American Society of Refrigerating Engineers, Skytop, Pa. Headquarters at the Skytop Club.*

JUNE 25-28, 1934. *Semi-Annual Meeting of the American Society of Mechanical Engineers, Denver, Colo. Headquarters at the Cosmopolitan Hotel.*

SEPTEMBER 19-29, 1934. *Second Annual National Electrical and Radio Exposition, Madison Square Garden, New York.*

OCTOBER 29-NOVEMBER 2, 1934. *Sixteenth Annual Convention and Exposition of the American Gas Association, Atlantic City Auditorium, Atlantic City, N. J.*

DECEMBER 3-8, 1934. *Eleventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.*

BUSINESS BRIEFS

NEW BUILDING figures for April were quite optimistic and showed in total approximately a 100% increase over the preceding month, which is about double the usual seasonal rise. An examination of the figures shows that the increase is due not only to publicly-financed work but almost equally to a gain in privately-financed building.

All classes of buildings showed increases, but the only one that showed a very small increase was public building. Notable among the increases were those in commercial, industrial, educational, and recreational buildings.

Contemplated non-residential work showed a decline in March from February, but contemplated residential work showed an increase of approximately 200%.

Dodge figures for the first half of April available as we go to press indicate a substantial increase for that month as compared with March.

HEATING AND VENTILATING'S Index of Activity in Heating Business showed an increase in February to 37.5 from 35.3 in January. The figures are in per cent of the 1929 average, and are adjusted for seasonal variation. The February figure of 37.5 compares with 29.1 in February, 1933.

February shipments of oil burners showed a more than seasonal decline, as did air washers. Air conditioning units dropped slightly from the January figure. This was also true of propeller fans. Blower sales and electric motors for fans both showed a sharp drop. Sales of industrial unit heaters increased in the face of a normal seasonal decline. This was also true of unit ventilator sales. Sales of indirect heating surface rose sharply, but those of cast-iron indirect surface were off. New orders for steel heating boilers, in number of square feet of heating surface, set a new low during the depression.

Round and square cast-iron boilers both showed a gain in February, as compared with January, but cast-iron radiators were off, as were convection radiators.

Employment in manufacturing plants making steam and hot water heating systems increased from 23.4 in January to 24.3 in February. The figures are in per cent of the 1926 average.

HIGHLIGHTS of PWA work: the entire $3.3 billion appropriated for the PWA has been allotted.

Contracts on nearly 80% of the non-Federal projects have been sent out.

The peak of the PWA re-employment is expected in May or June.

Schools account for about 10%; hospitals, 4.4%; housing 7.8%; and other buildings, 4.2% of the total PWA allotments.

A 60% INCREASE in non-residential building is shown in Dodge reports for the first half of April, as compared with the corresponding period in 1933.

GROSS sales of the American Radiator and Standard Sanitary Corporation for the first two months of this year were 48½% above those for the corresponding two months of last year, R. J. Hamilton, secretary and treasurer, told the stockholders at their annual meeting April 11. March probably will prove to have increased those figures, he added.

Despite the increase the company was in the red but its loss for the two months this year was small when compared with that of a year ago, Mr. Hamilton said. He commented that the company ordinarily is in the red in the early months of the year owing to the seasonal nature of its business.

ARMSTRONG CORK COMPANY on April 7 announced a 10% pay increase for employes in its seven plants.

DESPITE the continued shortage of mortgage money, an encouraging increase in construction work in various parts of the nation was reported for the first quarter of 1934. The totals in many communities are well ahead of the figures for the same period of 1933, and the outlook for the remainder of the year is much brighter than it was a year ago.

Heavy building and public works have helped to swell the total, and indications of a growing need for new homes in many cities are given. Builders believe that their industry holds the key to general business recovery, and are hopeful that further government funds will be made available to keep their workers busy until private funds are available.

According to E. M. Craig, executive secretary of the National Association of Building Trades Employers and member of the Construction Code Authority, figures gathered from 75 key cities indicate that after several years of inactivity the industry has passed its low point, with first quarter returns of 1934 showing nation-wide construction work approximating $500,000,000, as against $200,000,000 for the first quarter last year.

New York City March building permits were 41% above the same month of 1933. The report said "an adjustment of building wages was essential to sustained recovery."

For Philadelphia the outlook was said to be far more promising than was 1932 or 1933. For the first three months this year building work amounted to $2,373,610, as compared with $1,582,493 for the first 1933 quarter.

In Chicago the first three months showed $1,674,675 building work, against $340,800 for the first quarter of 1933. For that city it was estimated that the first half of 1934 would exceed the $3,600,000 figure for the whole of last year.

For Portland, Ore., a "marked improvement" was noted over 1932 and 1933, with $21,000,000 in public works proceeding. Apartment build-

ing has been at a standstill for four years, and the apartment rental situation has improved.

In Cleveland, the first 1934 quarter showed building work totalling $973,825, against $762,848 for the same months last year. A shortage of new home construction and improvement in apartment renting was noted.

In Detroit a sharp decline in apartment vacancies has accompanied the increase in automobile manufacturing. Permits for March total $434,599, as compared with $157,391 for March, 1933. In Kansas City a shortage of new houses and of small flats was reported, with $6,000,000 in public works under way, and in Memphis, Tenn., the first quarter's building was well ahead of the same period last year and the year before. Several cities in Texas, notably Dallas, Houston, and El Paso, reported a need for new housing of some types due to the "undoubling" of families.

"This survey bears out the government report that a home shortage exists in many sections and that an expenditure of several billions of dollars will be necessary to overcome it," said Mr. Craig.

BUILDING trades employers in Chicago are awaiting with some gloom the expiration of the Building Trades Agreement in that city consummated in 1929 and which expires May 31, 1934. The building trades are demanding a 6-hr. day following expiration of the existing agreement.

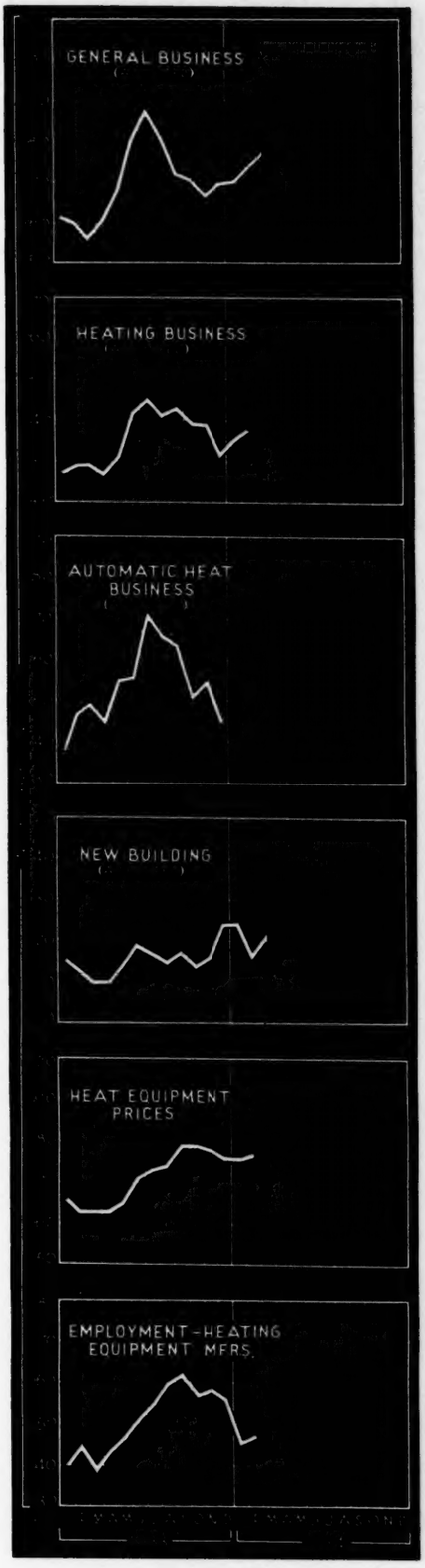
Annual Reports

HART & COOLEY COMPANY, INC., had a net income of $135,002 in 1933 against $180,007 in 1932.

JENKINS BROTHERS and subsidiaries had a 1933 net loss of $32,134, compared with a 1932 loss of $333,006.

OWENS-ILLINOIS GLASS COMPANY in the 12 months ended March 31 made a net profit of $6,993,489, compared with $2,460,008 in the previous 12 months.

Business Trends



Above charts marked "adjusted" are those in which corrections have been made for seasonal variation. The heating business chart is that of HEATING AND VENTILATING'S Index of Heating Business Activity. New building figures are based on reports of F. W. Dodge Corporation for 37 states. Data on prices of heating equipment and employment are from the Bureau of Labor Statistics, U. S. Department of Labor.

NATIONAL RADIATOR CORPORATION reports a net loss for 1933 of $853,-191, against $258,017 loss in 1932.

RICHARDSON & BOYNTON COMPANY reports a net loss for 1933 of $306,-851, compared with a loss of $493,-787 in 1932.

B. F. STURTEVANT COMPANY and subsidiaries report for 1933 a net loss after depreciation, interest, and other charges of $226,714, compared with $617,110 loss the year before.

THOMPSON - STARRETT COMPANY, INC., for the nine months ending January 25, had a net loss of $133,-112, as compared with a net profit of $5,488 for the nine months ending January 26, 1933.

UNITED STATES RADIATOR CORPORATION lost $888,055 in the fiscal year ending January 31, compared with a loss of $1,543,898 in the previous year.

WOLVERINE TUBE COMPANY in 1933 had a net income of $48,358 compared with $25,245 in 1932.

First Quarter Reports

A. M. BYERS COMPANY and subsidiary had a net loss of $183,902 in the first quarter against a loss of $256,672 in the 1933 first quarter.

JOHNS-MANVILLE CORPORATION lost $76,081 in the first quarter of 1934, compared with $953,780 loss in 1933.

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY reports for the first quarter of 1933 a net loss of $21,-425 against a loss of $128,256 in the first quarter of 1932; net sales were $655,166 against $382,522.

OTIS ELEVATOR COMPANY had a net loss in the first quarter of 1934 of $252,051, against a $608,717 loss in the first quarter of 1933.

NEW EQUIPMENT

Detroit Lubricator Has Cabinet Thermostat

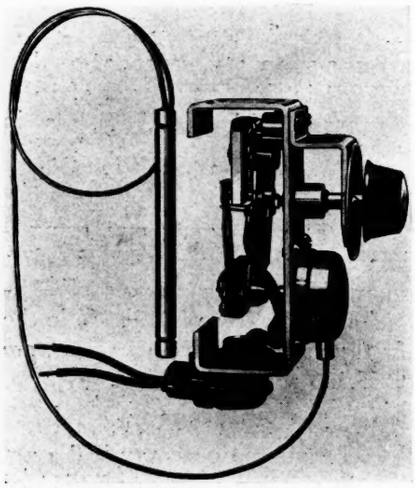
The No. 261 Cabinet Thermostat has been announced by the Detroit Lubricator Co., Detroit. It is designed primarily for automatic temperature control of forced circulation, cabinet type, cooling or air conditioning units.

On units for heating, the thermostat is arranged to break an electric circuit on increase of room temperature and may control an electric heating element on electric unit heaters or control a gas valve, either solenoid or electric, on gas-fired unit heaters. In either case, thermostat may control the fan also. It can be used to control the fan on units heated by steam or hot water or to operate a solenoid or electric valve in the steam or water supply.

For cooling units, the thermostat is arranged to make circuit on increase of temperature, to control a solenoid or electric valve in the refrigerant or cooled water supply or to operate the fan. Both fan and valve may be controlled at the same time if desired.

The device is installed with a thermostatic bulb rigidly fixed in the path of the incoming air. The switch mechanism is mounted inside a suitable location in the front of the cabinet. The assembly may, if preferred, be mounted on either side or on the top of the cabinet. The device is furnished as standard with adjustable ranges for heating from 45° to 80°, or for cooling from 75° to 95°.

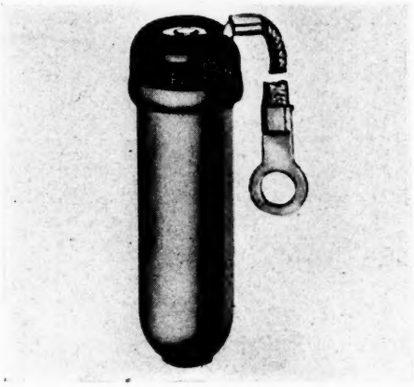
The company also recently announced the No. 674 thermostatic expansion valve, non-adjustable type, designed for factory-assembled units produced in large volume.



Detroit thermostat for heating and conditioning units

Jefferson Announces Mercury Switches

Jefferson Electric Co., Bellwood, Ill., has entered production on a metal-clad mercury switch, for use in controls and similar applications.



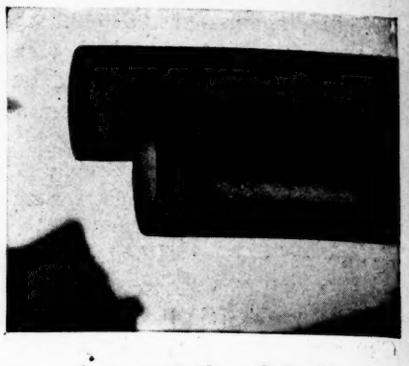
Metal-clad mercury switch

Some time ago this company placed switches on test with various users of such equipment, and they withstood severe service for approximately six million operations.

The case, made of a specially selected iron which prevents amalgamation, is treated to eliminate corrosion. The design permits operation through a very narrow arc, and the switch is compact. They are made in capacities up to 15 amperes and in several styles with one or two leads, grounded or insulated types, and in a range of sizes.

Arco Cast-Iron Threaded Pipe

To provide a pipe with the durability of cast iron that will sell on the same price level as galvanized steel pipe and can be cut or threaded with standard tools, American Radiator Co., New York, is now marketing a new non-alloy, cast-iron, threaded pipe.



Arco cast threaded pipe

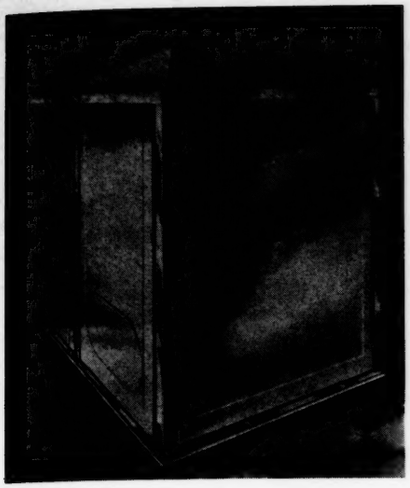
The pipe, known as Arco cast-iron threaded pipe, is cast vertically in dry sand molds with dry sand cores to obtain a perfectly straight and round pipe without gate marks or seams along the sides. It is provided in sizes of 1½, 2, 2½, 3, 4, 5, and 6 in., with the same outside and inside diameter as that of extra heavy, wrought steel pipe.

Stock lengths of 6 or 12 ft., as well as special lengths cut to measure, are furnished with all lengths over 6 ft. made up by electrical resistance weld at the factory. The pipe can be obtained with plain ends, threaded ends, or with one end threaded and the other end a tapped bell to make possible rapid and easy assembling on long runs, such as in rain leaders or suspended sewer lines.

Gilbarco Boiler-Burner and Warm-Air Unit

A boiler-burner unit and a conditioned warm-air unit were announced by the Gilbert and Barker Manufacturing Co., Springfield, Mass., at the recent oil burner exposition.

The boiler-burner unit has a combustion chamber entirely surrounded by water-backed surface and is equipped with low water cut-off, the Gilbarco Draftometer, and other built-in controls. Pressure, vacuum, and water gauges are visible through an indirectly illuminated instrument



Gilbarco conditioned air unit

panel in the front. The unit in plan is 26 in. × 42 in., and 52 in. high, with a steam capacity of 600 sq. ft. of radiator.

The warm-air unit heats, cleans, humidifies, and circulates the air. It has an air-cooled jacket, metal frame, and 16-gauge steel panels. The radiator is of welded steel with ground joint connections to the combustion chamber, which is one piece vertical thin construction. The humidifier is a gravity vaporizing type, electrically controlled. This unit is equipped with Gilbarco Model S-1 burner.

The dimensions are 53 in. × 67½ in. in plan with a height of 66 in. Its capacity is 150,000 B.t.u. per hr. net.

Marsh Combined Thermometer and Gauge

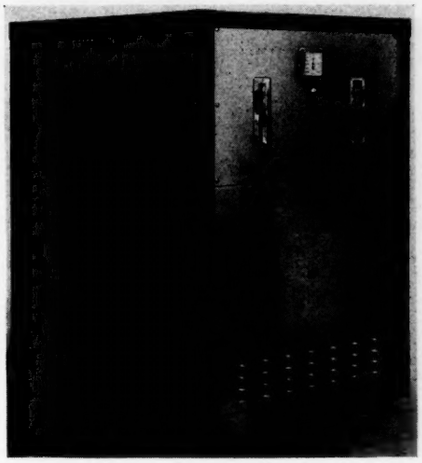
Altitude gauge and thermometer are combined in a single dial-type instrument in the Marsh Ther-Alti-Meter, a recently announced product of the Jas. P. Marsh Corp., 2073 Southport Ave., Chicago. The instrument, designed for either heating or industrial application, indicates both hot water or low steam temperatures and pressures or feet of water.

Two separate and independent sets of indicating mechanisms are incorporated within the instrument, both utilizing the bourdon tube principle. The connection socket is fitted with a temperature sensitive bulb, and a pressure opening communicates with a bourdon tube, which operates the pressure gauge in the conventional way.

Dial readings of from 80° to 250°, and from 0 lb. to 30 lb. pressure or 0 ft. to 70 ft. of water, are standard. Dial size is 3½ in., and the gauge is available with black finish or in colors to match the apparatus. It is also made with chrome-plated, nickel-plated, or polished-brass finish. Connection, which may be either bottom or lower back, is ½-in. I.P.S. male.

Wayne Boiler-Burner Unit

Wayne Oil Burner Corp., Ft. Wayne, Ind., has introduced a cast-iron sectional boiler-burner unit.



Wayne boiler-burner unit

The burner is the company's Standard S-4 type. Water heater and low water cut-off are optional. The combustion chamber is of molded refractory.

Available in three sizes, the unit has ratings from 840 to 2100 sq. ft. of steam radiator load, and equivalent water ratings.

Newport Humidistat and Humidity Indicator

Attractively finished in a bakelite cover, the Newport humidistat, available from the Johnson Tool Co., 65-67 Massasoit Ave., East Providence, R. I., is a positive action device and readily operates any type of electrical equipment used in domestic or industrial air conditioning systems. A hygroscopic membrane is employed as the acting element. An adjusting lever provides for regulating the degree of relative humidity and a mercury switch is used to make and break the electrical circuit. The base is drilled to be attached to a standard wall switch.

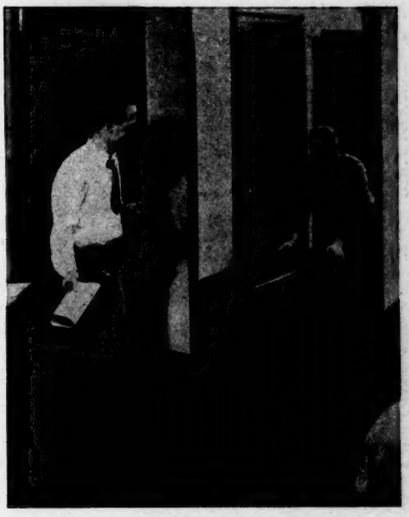
The instrument is 4¾ × 2¾ × 1¼ in. with an operating differential of 3% relative humidity, a scale range of 20% to 70% relative humidity, and an electrical capacity of one ampere at 110 volts. Stock colors are ivory, mahogany, and walnut.

This company also makes the Air-Meter, an instrument for indicating the degree of relative humidity and the temperature. This instrument is finished in bakelite with silvered dials for mantel or desk use.

Westinghouse Portable Room Cooler

A portable air cooler—the "mobilaire"—is announced by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Rubber-tired castors in the cooler's base permit it to be wheeled easily from room to room.

The "mobilaire" contains a fan, cooling coil, and a condenser for circulating a refrigerating fluid. An average size office, living room, or bedroom can be cooled in the hottest



Portable room cooler

weather by its refrigerating capacity of one-half ton which is equivalent to the melting of one-half ton of ice every 24 hr. It circulates sufficient air to provide from eight to ten complete changes of air in the room every hour.

The cabinet is available in finishes of grain walnut or mahogany, or in a modern blue green finish with an inlaid Micarta panel.

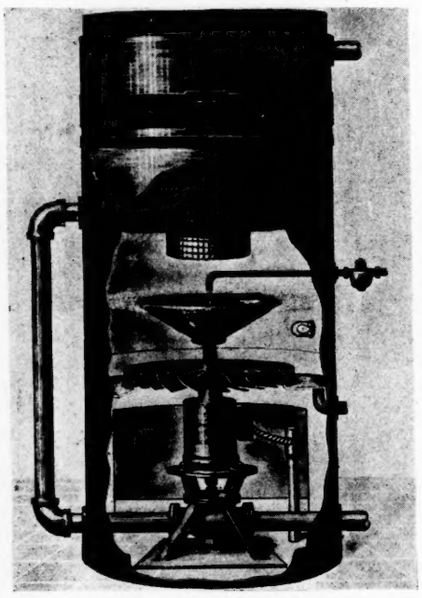
Lord-Kendall Year 'Round Conditioner

An unusually comprehensive line of air conditioning equipment in seven models and 43 sizes is marketed by Lord-Kendall Laboratories, 126 Newbury St., Boston. It is the claim of the manufacturer that the exact requirements of any new or old job can be met by virtue of the broadness of the line. Embodying numerous unique features, all L-K models are designed for continuous operation at variable speeds as a basic principle, providing constant ventilation with clean deodorized air, heat and moisture being added or subtracted as required by the season.

Air circulation is produced by a pressure-type fan, providing straight line flow. Washing and humidification are accomplished by means of a patented device called the Gyro-disc, which maintains a high speed fog film on less than 1 gal. of water per hour. Control of this water is effected through a double metering solenoid whose minimum setting provides sufficient spray for continuous washing and whose maximum setting is actuated by a room thermostat to maintain the proper relative humidity.

The air is warmed during the heating season by an eight-stage counterflow-type heat exchanger, supplied with hot water from a contingent boiler. During the warm season cooling is effected by tap water circulated in the same heat exchanger. Fan, water circulating pump, and the washer-humidifier are all mounted on a single vertical shaft, and are direct-driven by a variable speed motor, the whole assembly being supported on a vibrationless mounting. Motor speeds range between 400 r.p.m. and 800 r.p.m., assuring quiet operation and long life.

Controls operate entirely on the conditioner, the primary source of heat being independent of the room thermostats. One of these room thermostats regulates the air velocity by controlling motor speed, and the other operates a motor valve to prevent over-run. Operation of the oil-fired boiler is regulated entirely by aquastat on the boiler.



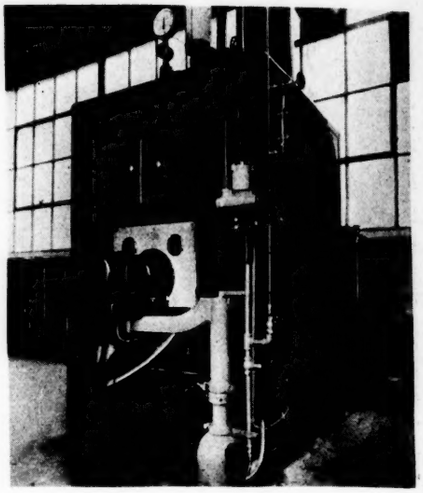
L-K air conditioner

Kelvinator Burner Features Variable Flame

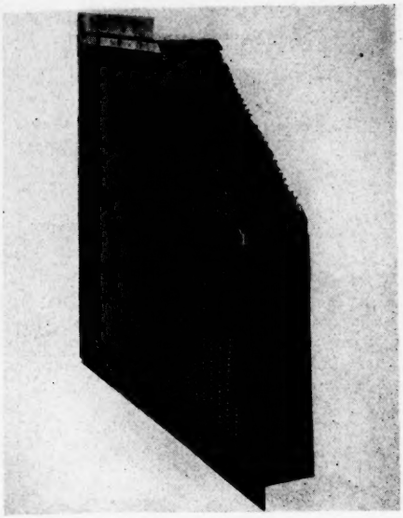
Featuring a new type of variable flame and super-sensitive hydraulic control system, the new Kelvinator oil burner for house-heating has gone into production at the Detroit factory of Kelvinator Corporation. Present plans call for distribution of the new burner largely through Kelvinator's existing sales channels. For the first year sales will be limited through a selected number of distributors in key cities as no effort will be made to get national distribution until merchandising experience has been gained with the new product and future sales policies set.

The burner operates with a variable flame, the size of which is regulated by the flow of oil which is automatically adjusted to the exact amount of heat wanted. The method by which the flame is varied to meet the requirement of heat is an important development. A non-electric, hydrostatic control, which operates with the simplicity of a thermometer, is used. A container carrying a fairly large quantity of a liquid which expands and contracts in accordance with the amount of heat present, is mounted in a room usually on the first floor of the dwelling in the place usually occupied by the thermostat. As the temperature of the room increases, the liquid in the container expands. Leading from the container down to the oil valve is a small capillary tube, fastened to a bellows which expands and contracts with the expansion and contraction of the liquid in the container. An increase in the temperature of the room expands the liquid in the temperature selector. This liquid in turn expands the bellows which in turn pushes in on the oil needle valve thereby cutting down the flow of oil to the burner. The user can obtain the desired temperature in his home by adjusting a screw which operates on the temperature selector and, after once setting it for the desired temperature, the controls as indicated above automatically operate to maintain that temperature.

Installation of the burner is easily made, the manufacturer states.



Kelvinator oil burner



Independent throw-away type filter

FibrePak Filter

Independent Air Filter Co., Inc., 215 W. Ohio St., Chicago, has developed a throw-away type air filter, the FibrePak, which has an expansion gap, or air space, between two filter cells. The filter medium is oil-treated, ribbon-like vegetable fiber.

Incoming air reaches and passes through the front filter cell at a normal velocity. Upon entering the air gap, however, the air expands and its velocity is reduced. Then, as more air presses into the gap, an increasing pressure is set up, the velocity is increased and the air passes through the rear filter once more at a normal velocity.

The filter is recommended for small ventilating projects, medium air furnaces, and in air conditioning applications.

Afco Furnace-Conditioner

American Furnace Co., 2719 Delmar Blvd., St. Louis, has announced the Afco Airstream unit, a warm-air furnace equipped with circulating, cleaning, and cooling apparatus. The unit can be obtained for burning coal, gas, or oil.

Stonhard Wallseal

A patching material for repairing broken and spoiled wall surfaces, both inside and outside, and known as Stonhard Wallseal, has been placed on the market by the Stonhard Co., 401 N. Broad St., Philadelphia. The material comes in powder form and is mixed with water to produce a stiff paste which will dry in 20 min. It can be used for sealing holes around pipes in floors or walls, for resetting tile, for filling cracks in pipe coverings, and other uses in addition to those in connection with patching and building walls.

Marsh Announces Square Gauges

Jas. P. Marsh Corporation, 2073 Southport Ave., Chicago, has announced a new line of gauges mounted in a modern design of square case. They are available in a wide variety of pressure applications and constructions in one size with 3½-in. dial.

They can be supplied with dial reading in pressure, vacuum, feet of water, or any other of a wide variety of pressure readings, and are available to manufacturers of boilers and to jobbers and dealers of plumbing and heating equipment in standard low-pressure steam graduations, as well as in a combination instrument in which the temperature, pressure, and feet of water are shown on the same dial for application to domestic hot water systems.

The instruments can be supplied with lower connection for mounting right directly in the top of the apparatus or with rear connection for application to the side or front of the apparatus. They can also be supplied to boiler manufacturers for flush-mounting inside of the jacket. A wide variety of finishes is available.

Reif-Rexoil Boiler-Burner Unit

Reif-Rexoil, Inc., 37-41 Carroll St., Buffalo, N. Y., has placed on the market a boiler-burner unit consisting of a cast-iron sectional vertical boiler equipped with a Rexoil burner.

The combustion chamber is entirely surrounded by water to minimize radiation losses, and has a built-in refractory. A Taco-Abbott summer-winter hot water system is built-in. The burner, of the pressure atomizing type, is mounted on the end section and is flanged to the boiler. An automatic draft adjustor panel mounted on the boiler jacket is provided.

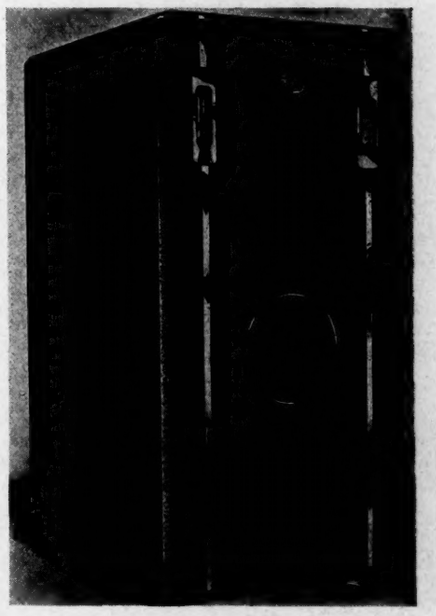
The boiler-burner, water heater, and controls are enclosed in an attractively finished metal jacket, well insulated. The trim is of chrome and ivory.

Iced Room Cooler

Chester J. Scanlan, P. O. Box 273, Bloomington, Ill., has placed on the market an iced air conditioner, a portable unit with a capacity of 300 lb. of cracked ice. The unit has a capacity at a maximum melting rate equivalent to 2 tons of refrigeration per 24 hr., and will operate on one charge of ice for about 8 hr. when cooling a 2000-cu. ft. room.

Burnham Oil-Burning Boiler

Burnham Boiler Corporation, Irvington, N. Y., displayed at the Philadelphia Oil Burner Show its new Burnham oil boiler, a cast-iron unit developed especially for oil burning.



Burnham oil-burning boiler

The combustion chamber is entirely surrounded by water with factory-molded refractory supplied to suit the burner to be installed. An automatic draft adjuster, panel-mounted on the boiler jacket, and a built-in domestic hot water heater are included. The unit is finished in chromium and ivory trim.

Rochester Humidimeter

Supplementing its line of dial thermometers, the Rochester Manufacturing Co., Rochester, N. Y., is now in production on its Humidimeter, a humidity indicating instrument.

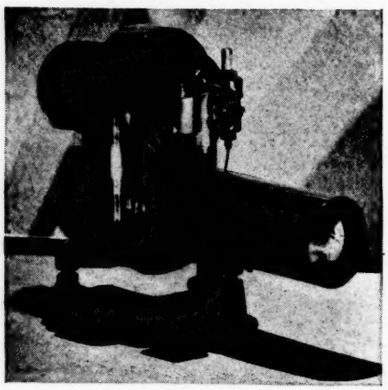
The instrument has been carefully designed, not only in its fundamental function of indicating the per cent of relative humidity, but with a view to eye-appeal and utility in the home. The unit itself may be used either on the desk or wall.

Toridheet Adds Model C Burner

The Model C pressure atomizing burner was recently presented to Toridheet dealers by Cleveland Steel Products Corp., Cleveland.

One of the features of the model is the "whirlpool turbulence" method of providing air for combustion. The design of the fan housing creates a whirlpool motion of the air before it escapes through the draft tube into the combustion chamber of the heating plant.

The motor is ⅛ hp., 110 volts A.C., 60 or 25 cycles. The ignition is of the continuous electric spark type. The unit burns No. 3 oil.



Toridheet Model C burner

Ideal Cast Boiler for Use with Stokers

American Radiator Co., 40 West 40th St., New York, has announced the new Ideal Boiler No. 21 for automatic coal firing. The unit, while it does not include a stoker, is designed especially for stoker application. The stoker can be attached at the front, rear, or either side. Provision is made in the back section for a built-in or external water heater.

Boilers are available in four sizes, each for steam or water, with capacities ranging from 700 to 1300 sq. ft. of steam radiator, or equivalent, the capacities being the output at the boiler nozzle.

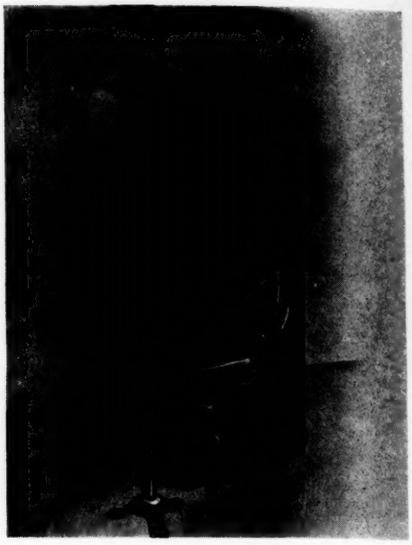
Bethlehem-Doe Heater

The Bethlehem Foundry & Machine Co., Bethlehem, Pa., is offering a self-contained automatic boiler-burner unit. Fired by a Bethlehem-Doe oil burner, the unit contains unusually small boiler tubes, an automatic combustion draft control, and a "tank-saver" set inside the boiler for production of domestic hot water. The oil burner, which is also adaptable as a conversion unit, is a gun-type with a rotary diffuser and rubber mountings to reduce vibration noise. Units are available in a variety of sizes. Each is with chromium-trimmed steel.

S-N Junior Burner

Scott-Newcomb, Inc., 1934 Pine St., St. Louis, is offering the S-N Junior oil burner which has a retail price of $160 plus tank and installation cost.

The electric motor operates in a vertical position and is mounted on an upright support. The end plate of the motor is attached to a "sump" which is always partly filled with oil. In this sump, and directly operated at motor speed, is a rotary air compressor and a piston type valveless oil pump. The oil and air mixture is delivered at about 1½ lb. pressure through ½-in. copper tubing to the spray nozzle head,



S. N. Junior oil burner

which is mounted in a special casting held by set screws applied to the firedoor of the heater.

The area of the spray nozzle orifice in this burner is 110 times the area of a pressure atomizing burner of the same capacity and this, together with other details of design, permits using heavy fuel oils without the need or use of screens or filters.

Installation of the burner is extremely simple. A few broken firebrick are thrown on the grates—the nozzle head support plate is attached in the firedoor opening. After the nozzle head support plate is secured in place, a sheet metal cover fits on to the support plate and is held by screws to cover the entire door opening, after which the nozzle head and transformer are quickly attached in place.

Monitor Push Button Stations

Monitor Controller Co., Baltimore, Md., offers a line of substantially constructed push-button pilot control stations. Type 9000M oil-immersed push-button stations are recommended for use in corrosive or damp atmospheres. The contacts operate under oil, and the umbrella-type buttons and cast-iron box construction provide a splash-proof enclosure. The complete switch mechanism assembly is

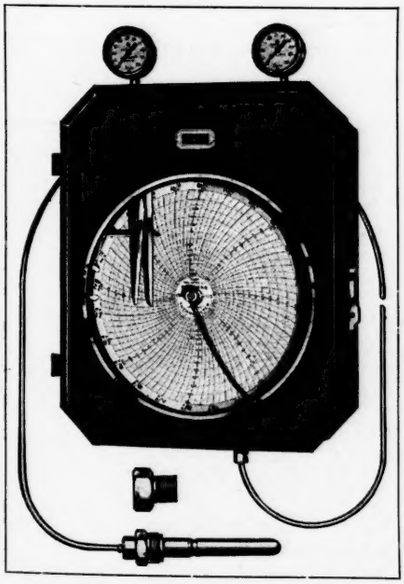
mounted on the cover, which includes the mounting screw holes and tapped conduit entrance. The enclosing box with the proper amount of oil can be affixed after this unit is permanently mounted and wired.

Type 9000V is primarily a compact heavy duty weatherproof control station. The stop button is in a conspicuous position for quick accessibility, while the start button is in a protected place to prevent accidental pressure. The fixed contacts are mounted on a square bakelite plate and fastened to the base by one screw, which permits adjustment of the contact plate to conform to the position of the conduit entrance. The conduit entrance may be turned to top, bottom, or either side, but the contacts are always set for operation with the stop button on the top.

The stations are available in single, two- or three-button type.

Fulscope Recording Regulators

The Fulscope recording regulator has been announced by Taylor Instrument Companies, Rochester, N. Y. The instrument is designed to overcome the difficulty of securing and maintaining either a throttling or on-and-off control when desired. It contains a Universal Sensitivity Adjuster which provides a full-range sliding adjustment by which the regulator performance can be perfectly balanced for any degree of apparatus time lag. A screw-driver adjustment on a graduated dial gives either throttling or on-and-off diaphragm valve action.



Taylor recording regulator

Temperature or pressure regulators are readily adaptable to applications requiring a different range by simply substituting a tube system and chart with the required range.

Control is maintained in the conventional manner by regulating the flow of air pressure to the diaphragm valve in the controlling medium line in response to changes in apparatus under control. A constant 25-lb. air pressure supply for actuating the diaphragm valve is recommended. However, should the pressure occasionally rise above or fall below the recommended figure, a compensating device maintains the desired control until normal pressure is restored.

The die-cast aluminum case is supplied in two styles—for face-mounting or for flush-mounting on panel boards. Standard finish is instrument black; white finish can be supplied.

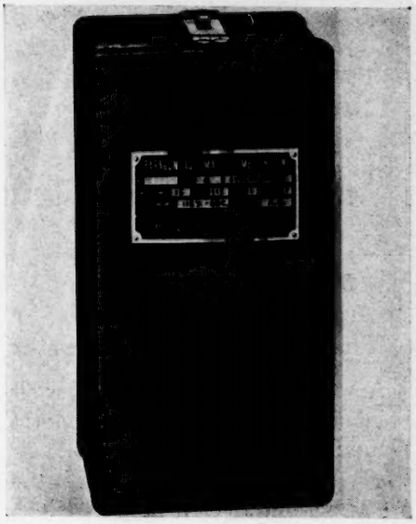
An electric chart-driving mechanism is standard equipment; a spring-driven mechanism is optional.

York Horizontal Boiler-Burner

York Oil Burner Co., Inc., York, Pa., has introduced a new boiler-burner unit, which consists of a horizontal steel boiler and a York burner. The finish is available in either crackle or smooth style with chromium-plated edging. The boiler which is completely enclosed, has an instantaneous water heater.

Paragon Time Controls

The Type G time control has been placed on the market by the Paragon Electric Co., Van Buren and Dearborn Streets, Chicago. This device is designed for operating oil burner controls, temperature regulators, stoker controls, and similar equipment for electrical circuits not exceeding 1600 watts.



Paragon time switch

Motor is of the self-starting synchronous type, self-lubricating, with gears housed in a dustproof shell which is 8 in. high, 4 in. wide, and 3 in. deep. The movement contains four heavy-cut brass wheels and steel pinions.

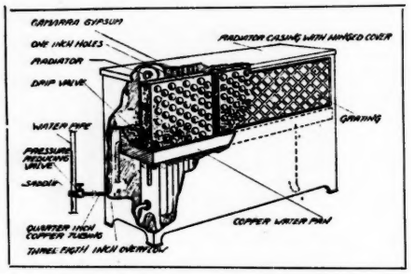
There are no friction slips between the dial and the motor. The "on" or "off" circuit can be manually turned at any time ahead of the automatic setting without disturbing the normal sequence of operation. The switch is of heavy molded bakelite and bronze with pure silver contacts, and is of the Underwriters' approved type for 1600 watt A.C. single-pull, single-throw or single-pull, double-throw, or any special two-circuit type.

The case is of 16 gauge, pressed steel with nickel-plated hasp and black crackle lacquer finish.

Bock Solenoid Valves

Bock Oil Burner Corp., 124 S. Dickinson St., Madison, Wis., has placed on the market a small solenoid valve for use in connection with high-low type oil burners, air conditioning apparatus, or similar applications.

The valve operates on 110-volt line voltage, has both a maximum flow and bypass adjustment, each of which is independent of the other. It is constructed entirely of bronze and stainless steel.



Blom-Gamarra humidifier

Blom-Gamarra Humidifier

An unusual type humidifier is being displayed by Blom-Gamarra Humidifier, 42 Broadway, New York. A feature of the device is the use of aerated gypsum blocks which absorb water, which in turn, is given off to the air as it passes over the blocks.

The gypsum is insoluble in water and acts as a strainer. Soluble salts which rise with the water are left at the top of the slab. The blocks are said to be able to withstand a temperature of 300°. One block, 10 × 13 × 2¼ in. will evaporate about 6 qt. of water per 24 hr.

The gypsum block which contains holes as shown in the illustration, is placed on edge in a pan of water, the blocks standing 2 in. in the water. Convection currents pass through the holes in the gypsum block and evaporate the water.

Another type, based on the same principle, is similar except that the top part of the slab is hooked up and over into an upper pan which is filled with water which flows into the lower one.

Other types are available for use with fin type radiators and warm-air systems.

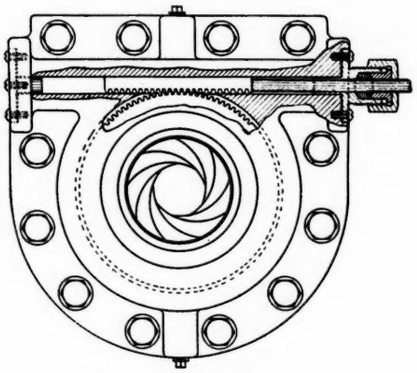
Pacific Announces Oil-Burning Boiler

A jacketed, fire-tube, steel, oil-burning boiler has been introduced by the Pacific Steel Boiler Corp., Division of the U. S. Radiator Corp., Detroit. The overall width of the largest size permits putting the boiler into a building through an average-size door. It is of the triple-pass type with a combustion chamber running the full length of the shell. Flue gas deflectors are fitted into 3-in. tubes, the large tubes being used to reduce the high draft losses.

The jacket is finished with a red front and top panel and black sides. A thick blanket of rockwool insulation closes the boiler on all sides and the top. The unit is available in eight sizes, ranging from 700 to 2310 sq. ft. steam radiator, as rated by the Steam Heating Boiler Institute. A similar range of sizes from 1120 to 3700 sq. ft. is available for water radiation.

York-Lalor Metering Valve

The York-Lalor Iris shutter valve is being marketed by the York-Lalor Division, York Oil Burner Co., Inc., York, Pa., for metering gas or air. One valve can be set



Iris type metering valve

on air, the other on gas, and in this way the proper mixture for the desired combustion can be obtained.

The unit is manufactured for either hand or power operation, piston or motor drive, and is available in sizes with shutters from 1 in. to 72 in.

Norge Humidifier

A room air conditioning unit, the Aerolater, has been placed on the market by the Norge Corp., Division of Borg-Warner Corp., Detroit. The unit is primarily a humidifier, but also washes and circulates the air.

The cabinet is constructed of heavy furniture steel with walnut finish. It has a maximum current consumption of 40 watts and operates at variable speeds from 900 to 1500 r.p.m. Acoustical material is used at both inlet and outlet in order to obtain quiet operation. Complete for installation, the cabinet weighs 55 lb. and has a capacity of air up to 8400 cu. ft. per hr.

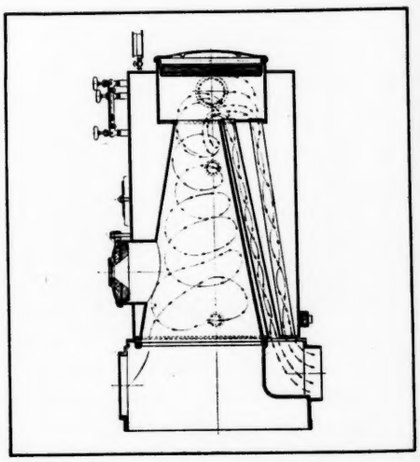
Dallas Floor-Type Circulator

Dallas Engineering Corp., 1115 Hall St., Dallas, Tex., has announced a new model propeller-type fan known as the floor-type circulator. This is a portable fan, adjustable in height from 5 ft. to 8 ft., and mounted on a base similar to a bridge lamp.

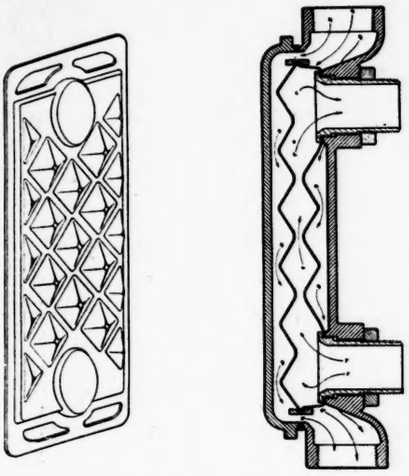
The fan is powered with a G. E. motor, available in both single and two speeds with either 19-in. or 22-in. blades. The fan guard is mounted direct to the streamlined bullet-shaped body and is intended for use in hotel lobbies, clubs, and similar buildings.

Titusville Ti-Cone Boiler

Titusville Ti-cone, a jacketed, oil-burning, steel boiler, has been placed on the market by The Titusville Iron Works Co., Titusville, Pa. The boiler has a cone-shaped combustion chamber, back of which are down-draft flues through which the products of combustion travel to smoke outlet at the base of the boiler. The unit is available in three sizes, with Steel Heating Boiler Institute ratings of 510, 748, and 1071 sq. ft. of steam radiator surface, and corresponding sizes for water.



Ti-Cone oil-burning steel boiler



Ipco indirect water heater

Ipco Heat Inductor

An indirect water heater has been announced by Iron Products Corp., La Crosse, Wis. This unit utilizes copper sheets clamped between simple housings and in such a way that the water or steam from the boiler passes around the outside of the sheets and the water to be heated passes between them. The copper sheets are given additional surface and strength by diamond-shaped corrugations.

The capacity of a single unit is 50 gal. per 100° of temperature rise in 3 hr., but by the addition of center sections the capacity may be increased to 250 gal. It is unnecessary to disturb piping connections in making this adjustment. Since the sheets and housing are clamped together by a number of bolts, the entire heat inductor can be dismantled for cleaning in a few minutes.

Deriaz Radiant Heat System

The Deriaz system of radiant heating, as installed in England, was described in a recent issue of *Engineering* (London). Pipes for the circulation of warm water are laid under the floor, the heat being transmitted to the flooring by means of "diffusers," which are strips of metal with a high coefficient of heat transmission.

The pipes are laid parallel, the joints being welded. Slope for drainage is provided by means of shims and packing. The diffusers are pressed into firm contact with the pipe to which they are clipped, and close to the pipe the diffusers are separated from the tiling to be heated by a considerable air space. As the distance away from the pipe increases the diffuser arms approach more and more closely to the underside of the tiling, reducing the air gap across which the heat has to be transmitted, until finally at the ends of the arms the diffuser is actually in contact with the flooring material. In this way, as the temperature along the diffuser diminishes, the heat is transmitted to the floor more and more easily. Owing to the air space above the pipes it is possible to use water at high temperature.

The size and shape of the diffusers depend upon the amount of heat to be transmitted, on the floor temperature desired, and on the material of which the floor covering will be made. The piping system is standardized to convey 70 B.t.u. per sq. ft. per hr. as a maximum output. Thus, on the one hand the floor temperature is quite bearable, and on the other the system is capable of making good any ordinary heat loss in a room. When a room is very much exposed to the cold, the pipes can be laid under the whole floor, but commonly it is only necessary to lay the piping system in front of the windows and in the center of the room.

A useful feature of the system is that it enables all vertical supply mains to be arranged in the center of the building. It is thus easier to employ fewer risers than would otherwise be necessary, and to place them where they are accessible.

Square-Cased Gauges

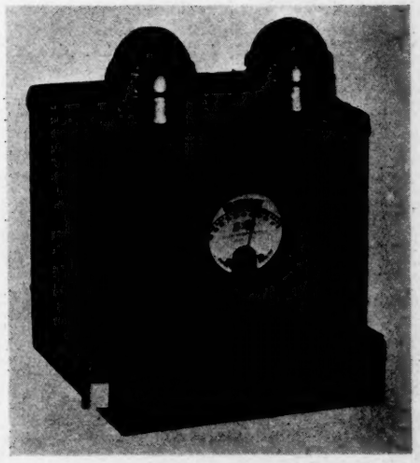
United States Gauge Co., 44 Beaver St., New York, has placed on the market a line of steam gauges in square cases, specially designed for modern heating and air conditioning units. The gauges are available in compound pressure and vacuum gauge types, with or without retard features, with or without internal siphon, and bottom or back-connected. They are also available with adjustable flanges for concealed mounting. The finish is black.

Electric Eye Insures Good Combustion

The Hazegage, a device designed to measure the haze density of combustion gases, thereby affording a definite means of combustion control, has been developed by the Ess Instrument Co., 816 Agnes St., Parkersburg, W. Va. This instrument operates by means of an "electric eye" and utilizes the principle that there is a definite haze point (registered by the instrument on a dial) for every fuel-air mixture, type of furnace, and operating characteristics. When the haze density coefficient corresponding to correct combustion is too light or too dark, the operator is warned by a visible or audible signal.

The indicator, although primarily designed for oil, coal, and pulverized fuel equipment, can be used to supplement Orsat analyses and other means for insuring maximum combustion efficiency with gas-fired equipment, inasmuch as the photo-electric cell is many times more sensitive than the human eye. Even infinitesimal variations in haze (or products of combustion) density are therefore detected.

A meter is provided giving continuous indication of haze. A red light indicates deficiency of air, and a green light excess air; when neither light shows, the operator is certain of being within correct zone.



The Hazegage

Sharp Increase Over Last Year in Degree-Days for Eastern Cities

March, 1934

	Atlanta	Baltimore	Birmingham	Boston	Buffalo	Chicago	Cincinnati	Cleveland
Degree-days for March, 1934.....	453	756	372	928	1128	995	795	1021
Degree-days, Sept. 1, 1933 to Mar. 31, '34	2665	4367	2148	5781	6424	5470	4630	5503
Degree-days, Sept. 1, 1932 to Mar. 31, '33	2647	3663	2339	4478	5374	5311	4353	4767
Comparison, season to date with last, %	+ 0.7	+ 19.7	— 8.2	+ 29.1	+ 19.5	+ 3.0	+ 6.4	+ 15.4
Degree-days, Sept. 1 to Mar. 31, Normal	2759	4162	2339	4188	5799	5491	4344	5390
Comparison, season to date with nor'l, %	— 3.5	+ 4.9	— 8.2	+ 38.0	+ 10.8	— 0.4	+ 6.6	+ 2.1
Lb. coal per sq. ft. rad., March, 1934...	3.624	6.048	2.976	7.424	9.024	7.960	6.360	8.168
Gal. oil per sq. ft. rad., March, 1934....	0.311	0.518	0.255	0.636	0.773	0.682	0.545	0.700
Cu. ft. gas per sq. ft. rad., March, 1934..	43.49	72.58	35.71	89.09	108.29	95.52	76.32	98.02

	Davenport	Dayton	Denver	Des Moines	Detroit	Duluth	Fort Wayne	Grand Rapids
Degree-days for March, 1934.....	926	871	653	925	1104	1378	1026	1119
Degree-days, Sept. 1, 1933 to Mar. 31, '34	5450	5029	3731	5500	6011	8391	5707	6130
Degree-days, Sept. 1, 1932 to Mar. 31, '33	5429	4600	5094	5770	5364	8192	5292	5569
Comparison, season to date with last, %	+ 0.4	+ 9.3	— 26.8	— 4.7	+ 12.1	+ 2.4	+ 7.9	+ 10.1
Degree-days, Sept. 1 to Mar. 31, Normal	5718	4787	5072	5825	5695	7911	5330	5827
Comparison, season to date with nor'l, %	— 4.7	+ 5.0	— 26.5	— 5.6	+ 5.6	+ 6.1	+ 7.1	+ 5.2
Lb. coal per sq. ft. rad., March, 1934...	7.408	6.968	5.224	7.400	8.832	11.024	8.208	8.952
Gal. oil per sq. ft. rad., March, 1934....	0.635	0.597	0.448	0.634	0.757	0.945	0.704	0.767
Cu. ft. gas per sq. ft. rad., March, 1934..	88.90	83.62	62.69	88.80	105.98	132.29	98.50	107.42

	Harrisburg	Hartford	Indianapolis	Kansas City	La Crosse	Los Angeles	Louisville	Memphis
Degree-days for March, 1934.....	892	922	922	717	1069	50	704	494
Degree-days, Sept. 1, 1933 to Mar. 31, '34	5216	5844	5030	4100	6480	778	4082	2766
Degree-days, Sept. 1, 1932 to Mar. 31, '33	4524	4799	4753	4453	6583	1116	3912	2911
Comparison, season to date with last, %	+ 15.3	+ 21.8	+ 5.8	— 7.9	— 1.6	— 30.4	+ 4.3	— 5.0
Degree-days, Sept. 1 to Mar. 31, Normal	4880	5303	4855	4966	6611	1255	3916	2854
Comparison, season to date with nor'l, %	+ 6.9	+ 10.2	+ 3.6	— 17.4	— 2.0	— 38.0	+ 4.2	— 3.1
Lb. coal per sq. ft. rad., March, 1934...	7.136	7.376	7.376	5.736	8.552	0.400	5.632	3.952
Gal. oil per sq. ft. rad., March, 1934....	0.612	0.632	0.632	0.492	0.733	0.034	0.483	0.339
Cu. ft. gas per sq. ft. rad., March, 1934..	85.63	88.51	88.51	68.83	102.62	4.80	67.58	47.42

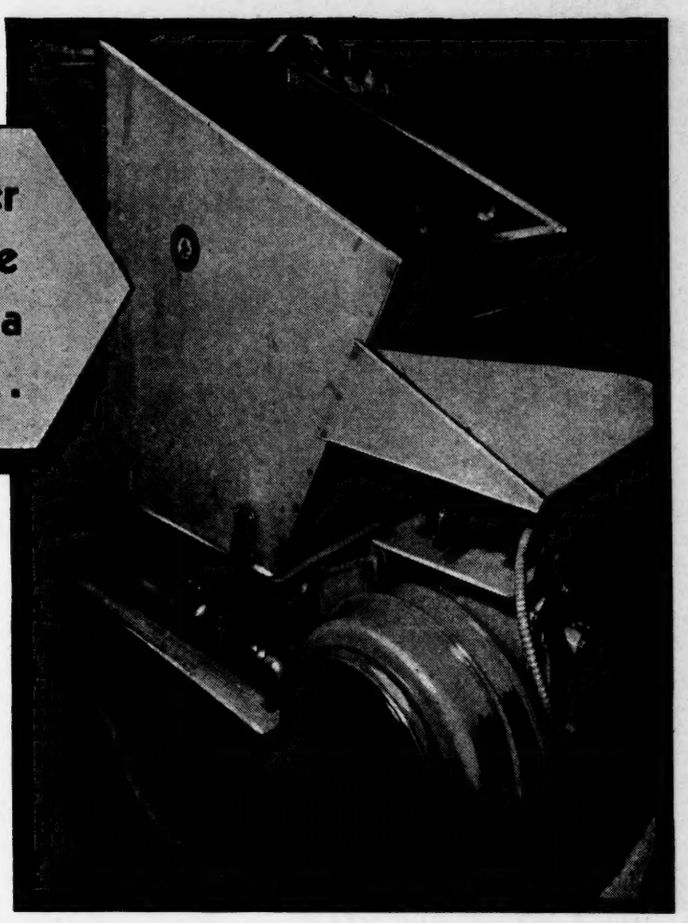
	Milwaukee	Minneapolis	New Haven	New Orleans	New York	Omaha	Peoria	Philadelphia
Degree-days for March, 1934.....	1077	1118	915	153	858	857	960	781
Degree-days, Sept. 1, 1933 to Mar. 31, '34	5989	6906	5566	843	5088	5049	5350	4590
Degree-days, Sept. 1, 1932 to Mar. 31, '33	5833	7027	4614	1075	4211	5385	5211	3772
Comparison, season to date with last, %	+ 2.7	— 1.7	+ 20.6	— 21.6	+ 20.8	— 6.2	+ 2.7	+ 21.7
Degree-days, Sept. 1 to Mar. 31, Normal	6208	7045	5129	1023	4707	5633	4535	4385
Comparison, season to date with nor'l, %	— 3.5	— 2.0	+ 8.5	— 17.6	+ 8.1	— 10.4	+ 18.0	+ 4.7
Lb. coal per sq. ft. rad., March, 1934...	8.616	8.944	7.320	1.224	6.864	6.856	7.680	6.248
Gal. oil per sq. ft. rad., March, 1934....	0.738	0.767	0.627	0.105	0.588	0.588	0.658	0.536
Cu. ft. gas per sq. ft. rad., March, 1934..	103.39	107.33	87.84	14.69	82.37	82.27	92.16	74.98

	Pittsburgh	Portland, Ore.	Providence	Reading	Rochester	St. Louis	Salt Lake City	San Francisco
Degree-days for March, 1934.....	883	305	907	861	1037	752	444	144
Degree-days, Sept. 1, 1933 to Mar. 31, '34	5174	2842	5691	5039	6297	4136	3673	1676
Degree-days, Sept. 1, 1932 to Mar. 31, '33	4530	3723	4638	4326	5208	4085	5419	2136
Comparison, season to date with last, %	+ 14.2	— 23.6	+ 22.7	+ 16.5	+ 20.9	+ 1.2	— 32.2	— 21.6
Degree-days, Sept. 1 to Mar. 31, Normal	4734	3732	5205	4876	5854	4309	4866	2124
Comparison, season to date with nor'l, %	+ 9.3	— 23.8	+ 9.3	+ 3.3	+ 7.6	— 4.0	— 24.6	— 21.1
Lb. coal per sq. ft. rad., March, 1934...	7.064	2.440	7.256	6.888	8.296	6.016	3.552	1.152
Gal. oil per sq. ft. rad., March, 1934....	0.605	0.209	0.622	0.590	0.711	0.516	0.304	0.099
Cu. ft. gas per sq. ft. rad., March, 1934..	84.77	29.28	87.07	82.66	99.55	72.19	42.62	13.82

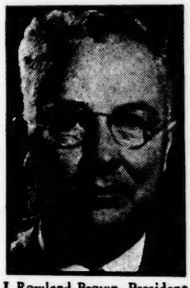
	Scranton	Seattle	Spokane	Syracuse	Toledo	Trenton	Washington, D. C.	Wichita
Degree-days for March, 1934.....	943	403	552	1012	1048	869	736	614
Degree-days, Sept. 1, 1933 to Mar. 31, '34	5889	3192	4406	6343	5795	5218	4376	3644
Degree-days, Sept. 1, 1932 to Mar. 31, '33	4985	3953	5463	5124	5243	4294	3761	4144
Comparison, season to date with last, %	+ 18.1	— 19.3	— 19.3	+ 23.8	+ 10.5	+ 21.6	+ 16.3	— 12.1
Degree-days, Sept. 1 to Mar. 31, Normal	5445	3932	5485	5984	5368	4450	4253	4421
Comparison, season to date with nor'l, %	+ 8.2	— 18.8	— 19.7	+ 6.0	+ 8.0	+ 17.3	+ 2.9	— 17.6
Lb. coal per sq. ft. rad., March, 1934...	7.544	3.224	4.416	8.096	8.384	6.952	5.888	4.912
Gal. oil per sq. ft. rad., March, 1934....	0.647	0.276	0.379	0.694	0.717	0.596	0.505	0.421
Cu. ft. gas per sq. ft. rad., March, 1934..	90.53	38.69	52.99	97.15	100.61	83.42	70.66	58.94

Fuel consumption figures given above are based on certain conditions, and for other conditions corrections must be made. The figures assume the use of steam radiators emitting 240 B.t.u. per sq. ft. per hr., a system operating at 100% efficiency, and radiators calculated for maintaining 70° in zero weather. Heating values assumed for the fuels are 12,000 B.t.u. per lb. for coal, 1000 B.t.u. per cu. ft. for gas, and 140,000 B.t.u. per gal. for oil. To correct for other heating values, efficiencies, and design conditions, follow the method explained in the "Heating and Ventilating Degree-Day Handbook."

This Iron Fireman stoker pays the Reliance Gauge Column Company 59% a year on its original cost . .



"Our fuel and labor saving is $1108.52 a year"



J. Rowland Brown, President of the Reliance Gauge Column Company.

says J. Rowland Brown, President

The amazing savings made with Iron Fireman firing are not due alone to the soundness of the stoker idea. In large measure Iron Fireman economy, efficiency, and long life lie in the soundness of Iron Fireman design and engineering and in excellence of construction. Because it is the pioneer and largest manufacturer in its field, Iron Fireman has been able to bring to the stoker industry a standard of manufacture that is typical of the best automobile practice. Iron Fireman is, in fact, built like a fine automobile. Quality materials are used throughout. Every part must measure up to the highest standards, so that the completed product will give years of maximum performance under any and all conditions.

The proof of Iron Fireman leadership is written in the performance records of thousands of installations in every conceivable firing application in heating and power boilers up to 250 h.p. The Reliance Gauge Column Company case is typical.

Reliance Gauge Column Company, Manufacturers of steam specialties, 5902 Carnegie Avenue, Cleveland.

In 1931 this well known manufacturer of steam specialties installed an Iron Fireman in a 125 h.p. Erie City H.R.T. boiler which carries 100 pounds pressure for heating and 200 pounds pressure for testing the company's products. The annual fuel and labor costs on this boiler with hand firing were $3354.07. With Iron Fireman, a year's fuel and labor costs were $2245.55—a saving of $1108.52—which means that the entire cost of the installation was more than paid for in two years.

"Besides this reduction in our cost of producing steam, Iron Fireman enables us to maintain a uniform steam pressure," writes J. Rowland Brown, president.

LEARN WHAT IRON FIREMAN CAN DO FOR YOU

The Reliance Gauge Column Company had an Iron Fireman survey and report and purchased after the facts had been laid before its officials. You can do the same. Ask for this free check-up. Get the facts and then decide. Iron Fireman can be quickly installed and may be purchased on monthly payments. Iron Fireman Mfg. Co., Portland, Cleveland, Toronto. Dealers everywhere.

IRON FIREMAN

AUTOMATIC *Self Regulating* COAL FIRING

IRON FIREMAN MANUFACTURING CO.,
3152 W. 106th Street, Cleveland, Ohio.

☐ Please make heating plant survey ☐ Send literature.

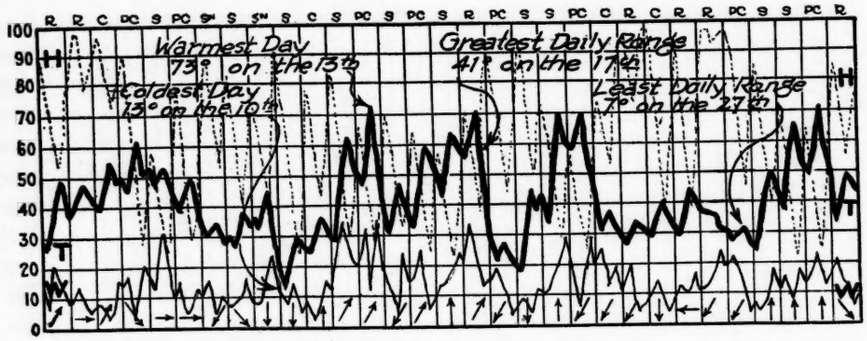
Name.....

Company.....

Address.....3

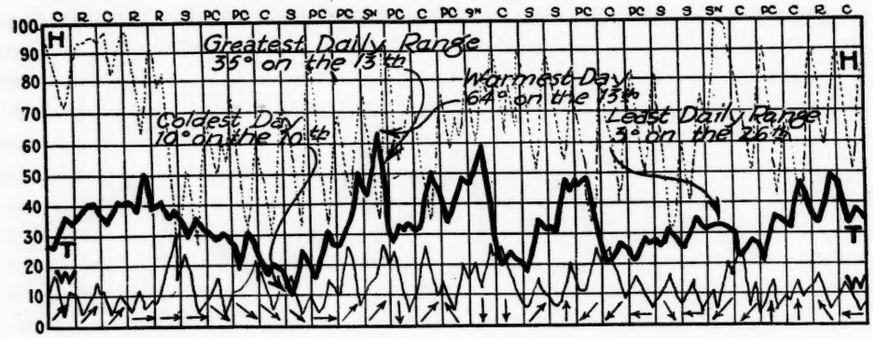
THE WEATHER FOR MARCH, 1934

Plotted from records especially compiled for HEATING AND VENTILATING by the U. S. Weather Bureau. Heavy curves (T), temperatures in deg. F.; dotted lines (H), per cent relative humidity, from readings at 8 a.m., noon, and 8 p.m., except for New York, which shows hourly readings. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions. S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.



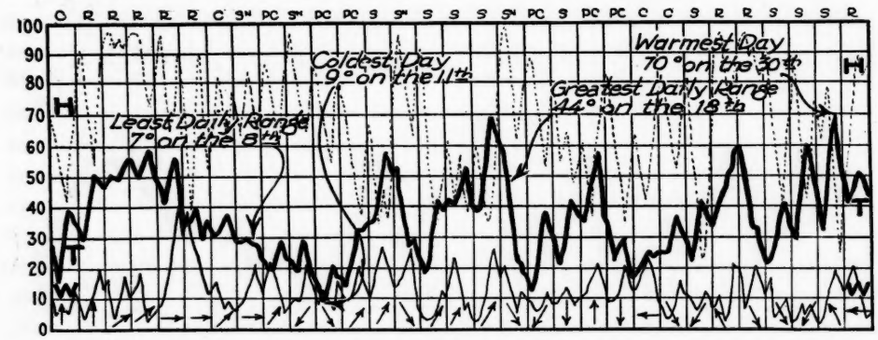
St. Louis

Mean temp. for month, 40.8°; aver. wind velocity, 12.7 m.p.h.; prevailing direction of wind, N.E.



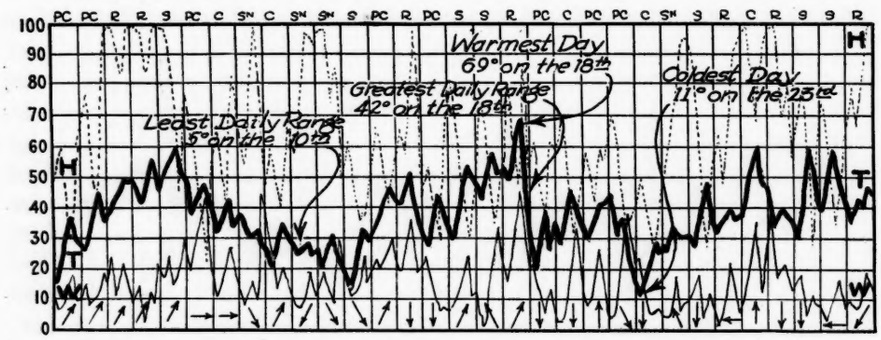
Chicago

Mean temp. for month, 32.9°; aver. wind velocity, 12.1 m.p.h.; prevailing direction of wind, S.W.



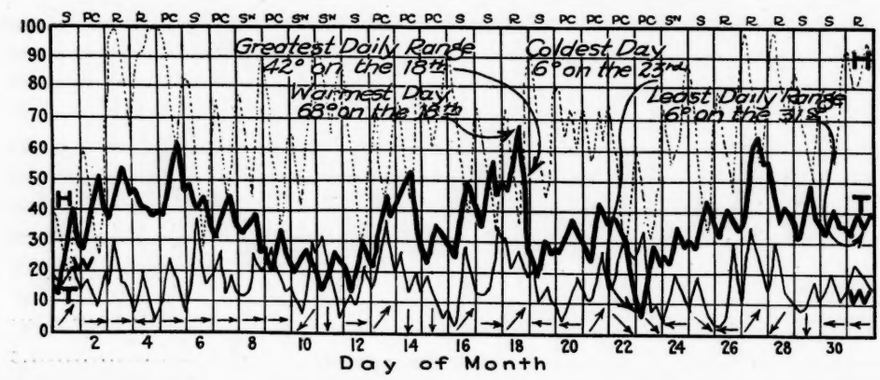
Pittsburgh

Mean temp. for month, 36.5°; aver. wind velocity, 11.0 m.p.h.; prevailing direction of wind, S.W.



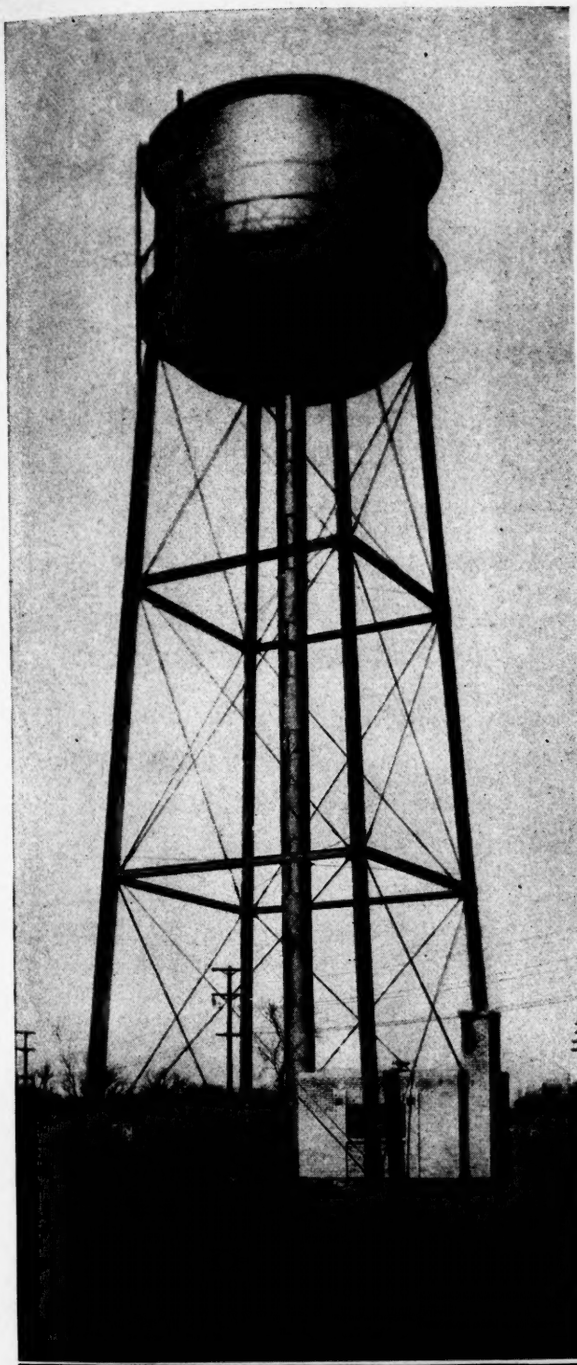
New York

Mean temp. for month, 37.2°; aver. wind velocity, 14.5 m.p.h.; prevailing direction of wind, S.W.


Greatest Daily Range
42° on the 18th
Warmest Day
68° on the 18th
Coldest Day
6° on the 23rd
Least Daily Range
6° on the 31st
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Boston

Mean temp. for month, 35.1°; aver. wind velocity, 15.2 m.p.h.; prevailing direction of wind, W.



HEATING

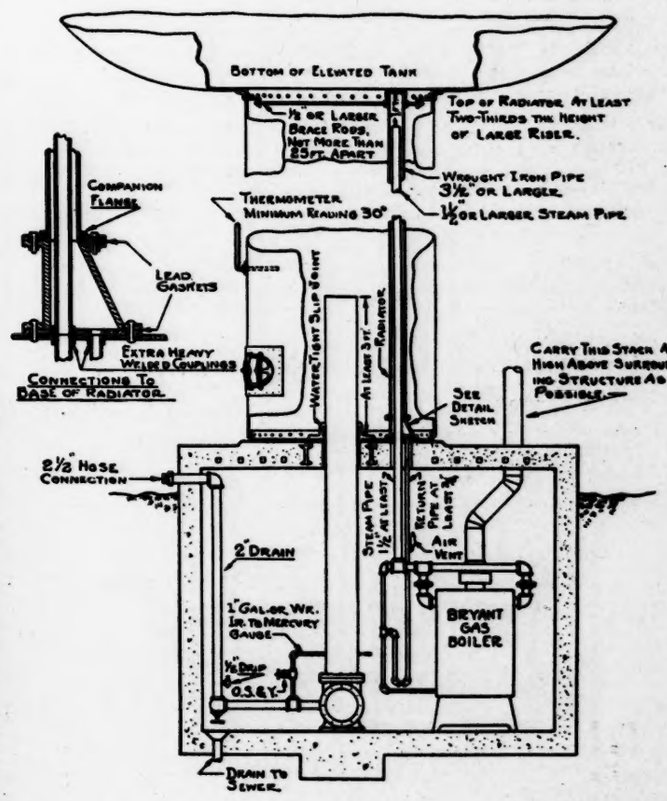
SPRINKLER TANKS

INSURANCE REQUIREMENTS make sprinkler tanks for fire protection a natural market for Bryant Automatic Gas Heating. The photograph shows a Bryant-heated tank in Maywood, Illinois, one of many similar installations. The drawing illustrates a typical installation.

THE BRYANT HEATER CO.

17828 ST. CLAIR AVENUE • CLEVELAND, OHIO

Bryant Gas Heating lets your pup be your furnace man


Bottom of Elevated Tank
½" or Larger Brace Rods, Not More Than 25 Ft. Apart
Top of Radiator At Least Two-Thirds the Height of Large Riser.
Companion Flange
Thermometer Minimum Reading 30°
Wrought Iron Pipe 3½" or Larger
1½" or Larger Steam Pipe
Lead Gaskets
Extra Heavy Welded Couplings
Connections To Base of Radiator
Watertight Slip Joint
At Least 3 Ft. Radiator
Carry This Stack As High Above Surrounding Structures As Possible
See Detail Sheet
2½" Hose Connection
Steam Pipe 1½" At Least
Return Pipe At Least 1½"
Air Vent
2" Drain
1" Gal. or Wr. Ir. To Mercury Gauge
¾" Drip
O.S.&Y.
Bryant Gas Boiler
Drain To Sewer

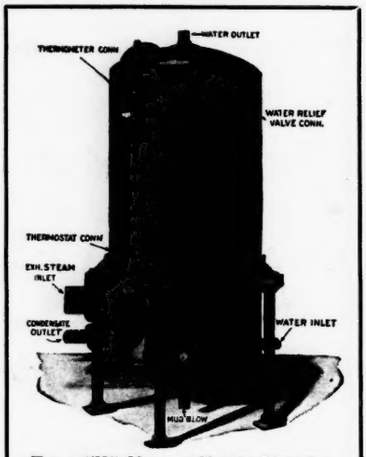
BRYANT

★ *Gas* ★

HEATING

YOUR → ← OUR
REPUTATION
← as →
Engineers Manufacturers
depends on details

"A chain is no stronger than its weakest link"—yes, and the same is true with reputations! Careful attention to every detail of a job is the surest way of building a good professional reputation—for you as Engineers and for us as Manufacturers.



Type "K" Heater, Vertical Design

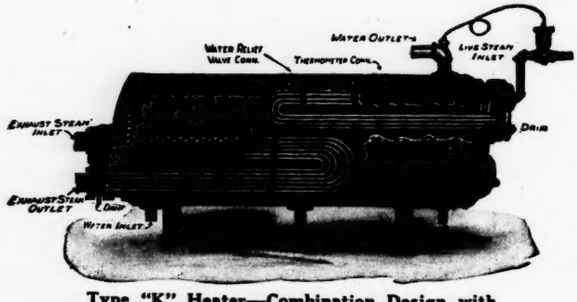
The popularity of Whitlock Heaters with engineers all over the country is due, in large part, to the attention paid to every detail of their design, construction, and testing.

Ample heating surface of full round seamless copper U-bends . . . bronze tube supports . . . riveting in accordance with the highest technical standards . . . shell materials (steel, copper lined, or solid EVERDUR) suitable for every working condition . . . hydrostatic testing of both shell and tubes . . . just for examples.

Your reputation is safe when you specify Whitlock—for we have taken care of the details. For your copy of Bulletin 40, address

The Whitlock Coil Pipe Company
40 South Street Hartford, Conn.

Consult telephone directory for local address in New York, Boston, Philadelphia, Chicago, Detroit, Kansas City, Baltimore, Charlotte, Los Angeles, San Francisco, Cincinnati, and other principal cities. In Canada address Darling Brothers, 120 Prince Street, Montreal.



Type "K" Heater—Combination Design with Auxiliary Heating Section

Abstracts

(Continued from page 47)

Dusts in Industry

The first part of this paper discusses the dusts which are harmful to workers in industry. From the observations of numerous other investigators in the field, the author concludes that the sizes from 0.5 to 3 microns are the ones which are the most dangerous to health.

Methods and apparatus used for dust analysis and the relative merits of each are taken up in considerable detail in the second half of the paper. While no method short of the research laboratory will yield completely accurate information concerning dust counts, the author believes that the impinger and Owens methods give the most satisfactory results.

[*"The Sampling and Analysis of Dusts in Industry," by Leonard Greenburg, C.E., Ph.D., M.D. A paper presented before the American Institute of Mining and Metallurgical Engineers, New York, February* 19, 1934; *contains a bibliography of references.*]

●

New Editions of A.S.T.M. Standards and Tentative Standards

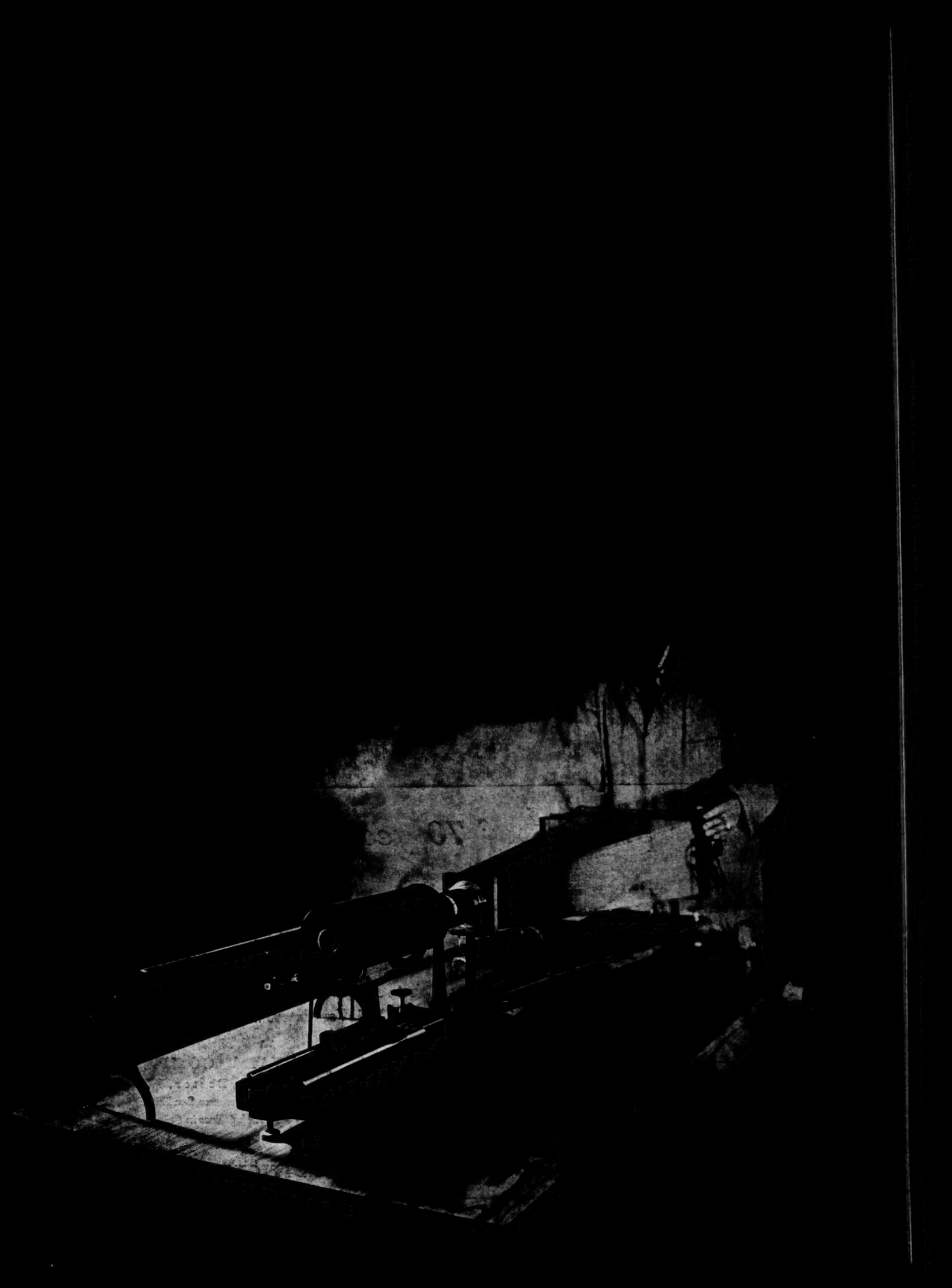
The American Society for Testing Materials recently issued a new edition of its three books on standards. The Book of Standards, which appears once every three years, is in two volumes and includes all standards specifications, methods of tests and definitions which have been adopted by the Society. The Book of Tentative Standards, which appears annually, contains all standards which have been tentatively accepted.

Volume 1, which relates to metals, of the Book of Standards contains 185 specifications, many of which are of interest to the heating and ventilating industry. There are, for instance, 18 standards for the various types of pipes, 11 for tubing, 11 for metal sheet, and many others relating to plates, castings, and other metal products.

Volume 2, on non-metallic materials, includes 285 papers. Of particular interest are the standards relating to asbestos, of which there are three papers. There are three papers on belting, two on firebrick for boilers, 10 on coal, 10 on coke, 9 on fuel oil, 13 on gypsum, and 11 on refractories.

The Book of Tentative Standards contains 233 specifications and test methods covering many important materials such as boilers, fuel oil, castings, gypsum, heat transmission of refractories, heat insulation, humidity determinations, metal plates and sheets, pipes and piping materials, and refractories.

[*"Book of A.S.T.M. Standards,"* 1933 *Edition; two volumes;* 2300 *pages;* 6 *in.* × 9 *in.; price, either volume,* $7.50; *both* $14.

"Book of A.S.T.M. Tentative Standards," 1933 *Edition;* 1134 *pages;* 6 *in.* × 9 *in.; price* $7, *paper cover.*

All published by American Society for Testing Materials, 1315 *Spruce St., Philadelphia, Pa.*]